MARCH 1982
75p

COMPUTER & VIDEO GAMES



STAR TREK 111·4

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COMPUTER & VIDEO GAMES

No. 5 MARCH 1982

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NEXT MONTH

WHEN (some people say "if") Prestel takes off, its games pages will enjoy a huge following. Even now, with Prestel sets mainly in business hands, the games pages are the most popular thing on the system. Next month we look at Prestel games and the limitations it imposes on its designers.

A CHANCE to take on your computer at the classic tank warfare game of Kriegspiel next month. We also feature Sub Attack on the VIC-20, Engineer and Yahtzee among our other games listings.

PINBALL machines are now talking back! Hear what they've got to say as we look at the latest arcade inhabitants.

Editor Terry Pratt

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Design Linda Freeman

Production editor Tim Metcalfe

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Advertisement assistant Louise Flockhart

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NEXT ISSUE ON SALE MARCH 16th

Isn't it about time you took out a subscription to Computer and Video Games?

Whether your idea of a worthwhile challenge is saving Europe in a war game, sharpening your chess strategy, or landing a 747 on a dark night, computers can make it possible.

Computer games are reaching new levels of exhilaration, realism and imagination. They can already test your intellect and dexterity to its limits, in the not-too-distant future there will be no limits to the excitement they can simulate.

Computer & Video Games is the monthly magazine designed to make sure you get the most out of your computer.

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Every issue's packed with pages of games programs for you to key-in to your machine. And you don't have to be a computer expert. Each month there's reviews of new computer and video games, regular pages on chess, adventure and kit-building.

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MAILBAG



Do you have any views or comments on Computer & Video Games? If so we would love to hear from you. We will also do our best to find answers to any queries you may have or solve problems you might be experiencing with your computer. Please drop us a line at: Computer & Video Games, EMAP, Durrant House, 8 Herbal Hill, London EC1R 5JB. If you have already sent in a letter which has not yet been published, please bear with us as we have been overwhelmed by mail after our early issues. We will get around to your query as soon as possible.

THE CASE AGAINST . . .

Dear Sir,
I am disgusted to read your article on Softporn in the January issue of your magazine. The magazine is purchased each month by my 13-year-old son, and I feel that articles of this nature are nothing less than criminal.

I appreciate that your magazine is not aimed specifically at children, but you must realise that it has a great attraction to those in my son's age group due to the increasing interest in computers in school. I know that you are not responsible for producing the Softporn program, but it is because of the irresponsible action you have taken in reviewing such trash that people become aware of the availability of these items, the sale of which further encourages their production.

In future can I ask you to take a more responsible stand against such items by refusing to review them, advertise them or include them in any way in your magazine, as I am certain that programs such as these are not only a direct conflict against my own Christian principles, but also offend many people and encourage a lowering of moral standards.

A. Standeven
Hadfield
Hyde
Cheshire

. . . AND FOR, SOFTPORN

Dear Sir,
Many thanks for a very enjoyable review of the Softporn game featured in your January issue. It sounds an entertaining and humorous game which I would certainly love to try — if only I owned a 48K Apple. Unfortunately my computer facilities are rather more humble.

I noticed you claimed that Softporn was one of a "new generation" of software aimed at the adult user. Is it likely that we will soon be seeing a computerised version of Libido and do you know of any similar "fun" adventures for the Acorn Atom?

C. Jacks
Chells
Stevenage
Herts

Editor's reply: Apart from its misleading title, Softporn seemed an innocent piece of fun and quite typical of this genre of adventure game presently reaching our shores from America. This magazine's function is to inform its readers about new trends in the computer games industry and I don't feel we can fulfill this properly if we hide from any aspects of that industry.



A DEALER TO RELY ON

Dear Sir,
At the time of writing I would like you to mention to your readers a company whose trading standards are second to none. A. J. Harding & Co (Molimerx); from Bexhill on Sea.

Two months ago I purchased a "disassembler" program from them and when I purchased my printer (locally) last week, I found that I could not get a print out due to incompatibility between TRS-80 and Video Genie. However, I wrote to Molimerx and by *return of post*, I received another tape compatible with my machine. They didn't even ask me to return my original purchase. The point of this is; I have had my share of sending money off for software and waiting weeks, and, eventually after numerous letters receiving my goods.

I came to this company through reading a similar letter to this and I have never been let down. Orders are despatched return of post. I shall now be writing to Mr Harding to thank him personally (and return the other tape).

I have no connection with the company, my only motive is to thank them and perhaps help newcomers to computing find a reliable software dealer. Because, they will soon learn, there are a lot of shady dealers in this game.

Keep up the good work, I am looking forward to the next edition.

K. Hook
Burnley
Lancs.

ADVENTURE ON COURSE

Dear Sir,
As a student taking a course in computing I am considering writing a program on the theme of adventure. Because of this, I am very interested in Keith Campbell's article and look forward to reading it each month.

I would, however, be grateful if you could possibly include in your article certain details of the program which can be incorporated into a 380-Z computer as this is the computer with which most of my project work is based.

Also, I was wondering if articles on flowcharts and how they work, hardware computer storage, would be included in future editions because I'm sure if this were done, it would generate a great deal of interest among beginners.

Ian Clark
Dalton
Huddersfield
Yorkshire

Editor's reply: I hope you have been able to follow the Adventure columns so far Ian, as Keith Campbell has taken care to keep the instructions within the range of any Basic user.

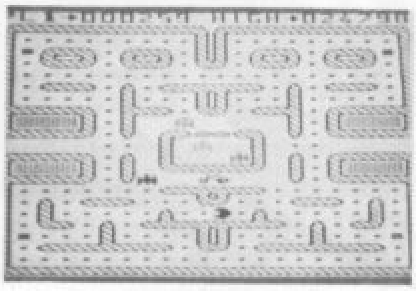
We have not featured Research Machines' 380-Z computer in the magazine as yet because it is a specialist educational computer far out of the price range of most home users. But we will try to rectify that for school and college computer users in the future.

AT LAST!

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VIC SOFTWARE

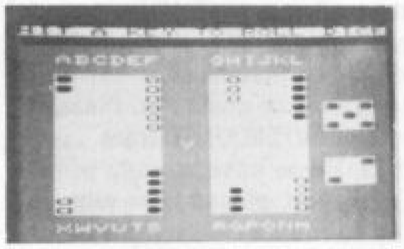
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Sinclair ZX81

★ NEW RELEASES ★

DICTATOR

Another great adventure game from Bug-byte for the 16K ZX81. This time, you are the president of a small state. The object of the game is to avoid revolution, escape assassination attempts, and maintain your popularity, while managing the secret police and army, and maintaining a secure economy. This is a very complex simulation, utilising the whole 16K, and the cassette comes with an 8-page booklet giving full instructions and hints on how to survive.

Can you stand up to the pressures of life as a dictator, and prevent unrest from spreading before it's too late? **PRICE £9.00**

CONSTELLATION

Turn your ZX81 into a telescope! This program will produce a simulation of the night sky as seen from any chosen point on earth at any time this century. You can point your "telescope" in any direction, move it up, down, left and right, zoom in or pull out, and display the stars by magnitude or constellation. **PRICE £8.00**

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STARTREK	£5.00	NOTE: all require RAM pack	

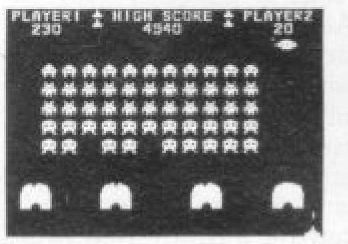
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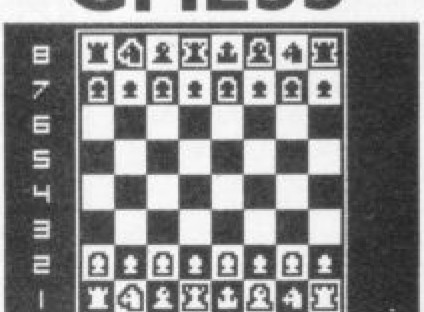


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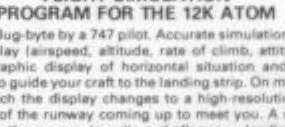


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Fantastic machine code chess game for the 12K Atom. Features include: screen (high res. + alphanumerics); many levels of play; castling & en passant; computer plays black or white. Supplied on cassette with instructions. *PRICE ONLY £9.00*

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747

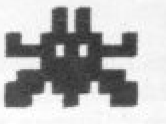


FLIGHT SIMULATION PROGRAM FOR THE 12K ATOM

Written for Bug-byte by a 747 pilot. Accurate simulation of a 747's cockpit display (airspeed, altitude, rate of climb, attitude, flaps, etc., and graphic display of horizontal situation and attitude); allows you to guide your craft to the landing strip. On making your final approach the display changes to a high-resolution 3D representation of the runway coming up to meet you. A real test of skill. Finding the runway is quite a challenge — landing safely is even more difficult. If you succeed, you are awarded a skill rating and the chance to take off and try again.

REQUIRES FLOATING POINT ROM **PRICE ONLY £8.00**

GALAXIAN



Fantastic high-resolution (mode 4) arcade game with fast-swooping aliens, excellent sound effects, and high score. 12K

PRICE £8.00

BACKGAMMON (7K, BASIC)

The program draws out a representation of a backgammon board and allows you to play the standard game against the computer. Playing instructions are not included, but if you can't already play the game, there are several books available to teach you, and the Atom makes an ideal, ever willing partner to build up your playing strength against.

Computer responses are rapid (approximately 10 seconds) and the program will not accept illegal moves. Dice throwing is controlled by the computer. **£7.00**

LABYRINTH (12K, F.P., BASIC, GR.Mod2A, sound)

High-resolution colour graphics (also effective in Black & White) make this 30 maze program one of the best versions available. To help you find your way through the bewildering array of corridors of the 30 x 15 cell random maze, you can call up to a 20-map of the maze. In the harder game option, this map shows only the portions of the maze which you have explored.

Your task is to find your way to the treasure room at the centre of the maze and then escape through the exit. To make things more difficult, several monsters (including the dreaded Minotaur) are loose in the maze, and you will have to fight you way past them. The types of monsters present, and their weapons can be altered by the user, if required. **£7.00**

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LUNAR LANDER (12K, BASIC & s.c., Gr. Mod4)

A highly addictive arcade style program. A rugged lunar landscape is drawn out and you have to attempt to land your craft safely on the flat areas, by varying the thrust of your main & steering rockets. If you succeed, the ship takes off, and you have to try to land it again, under slightly more difficult conditions. This continues, until you have reduced 3 ships to heaps of rubble.

On screen readout of fuel and score. Several skill levels. A record is kept of the high score. If you are a sufficiently expert pilot, you will be rewarded with extra ships. Definitely a cut above the average lunar lander!! **£5.50**

GOLF (8K, F.P., BASIC)

An 18 hole, par 72 course, complete with fairways, rough, bunkers, trees, streams & greens. Skill and careful club selection are required to get round with a good score. To make things more difficult, you have to specify a fault in your game, which the program will reproduce, and your handicap. At the end of the round, the program produces your scorecard for the round.

A highly entertaining program, which is likely to have you up late into the night straining for a par! **£5.00**

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MAILBAG



WIZARD COVERS

Dear Sir,
I can always spot your magazine without any trouble in my local newsagents — those fabulous front covers are the best in the trade!

I particularly enjoyed the wizard and dragon scene which featured on your January cover and feel Paul Bonner should be kept in mind for future issues. Did he also draw the Dragons which went with the Pet game?

I do not own a Pet, which is a pity because I liked the sound of the Dragon Druggin' game and the write-up that went with it had me in stitches.

All the best for the new year and thanks for being the best thing to come out of 1981.

Gerry Coulson
Teddington
Middx.

Editor's reply: We will certainly keep Paul Bonner in mind for future front covers Gerry, but he didn't draw the dragons which featured inside the magazine. These came from the pen of Dorian Cross and you will be seeing a lot more of his work in the magazine.

PACK UP YOUR TROUBLES

Dear Sir,
Having purchased a Sinclair ZX81, and finding myself with some money left after Christmas, I decided to purchase the 16K RAM pack (despite warnings of the combination crashing).

I think I should have heeded the warnings as pack No. 1 proved to be the cause of much unprintable language. I returned the faulty pack to my local W. H. Smith and set off home again with pack No. 2.

This worked perfectly and I have had no trouble at all with it.

I hope to see your excellent magazine printing a 16K games program for the ZX81 in the not too distant future, after all I can't be the only Sinclair owner with a working RAM pack, or can I?

David Freeman
Raynes Park
London SW20

Editor's reply: We have a 16K adventure for your Sinclair coming soon David.

VERY BASIC ON THE IBMS

Dear Sir,
I do not own a computer myself but I am a computer programmer by profession and have access to an IBM system 34 at work. We have a few games on it but they are all very basic games written by IBM trainees, I think. Are there any games available for such a computer, particularly adventure games?

T. A. Johnson
South Reddish
Stockport
Cheshire

Editor's reply: The only games available for IBM machines are written by individuals and not by the firm itself. There are some tapes in installations which are used for demonstration purposes, but these are usually passed around to people interested in playing games.

According to IBM no other firm is involved in writing games software for its computers, so your only chance is to exchange games with your fellow mainframe games enthusiasts. But, be warned, playing games on mainframe computers is a notoriously clandestine activity and neither companies or individuals are very forthcoming on the subject.

RESPONSIVE READERS

Dear Sir,
Much as I admire your splendid magazine which I have read from the first month. I have one grumble. The free information service which was in the first two issues looked a very good idea, but, as I was to find out, when put into practice the idea did not work out as well as I expected it would.

Being a TRS-80 model 1, level 2 microcomputer user, I used the information service to get replies and data on the Tandy.

I waited and waited after sending off the card on 1 November, I have not even had a wisp of a reply.

Incidentally I notice with interest that the information service was taken out of the magazine in the January issue.

Also I would like to ask if you are intending on publishing reviews on various microcomputers especially the new BBC computer in addition to the reviews on software, excellent though they are.

Finally could you confirm for me if it is true that Commodore are bringing out a new computer called the VIC-40, presumably containing a double amount of characters.

Warren Smith
West Bromwich
West Midlands

Editor's reply: It is time to make a full and frank apology about the reader reply card service we offered with our first two issues. It was supposed to benefit both readers and advertisers and free information services work well in many magazines. Unfortunately the response to our first two issues was so phenomenal that the company we used to process the cards found itself swamped and a backlog built up.

As the service was swamping advertisers and therefore, disappointing readers we decided to drop it. All the cards we received have been processed and sent out.

Turn to the Hardcore section Warren, and you will see that we are giving space to machine reviews.

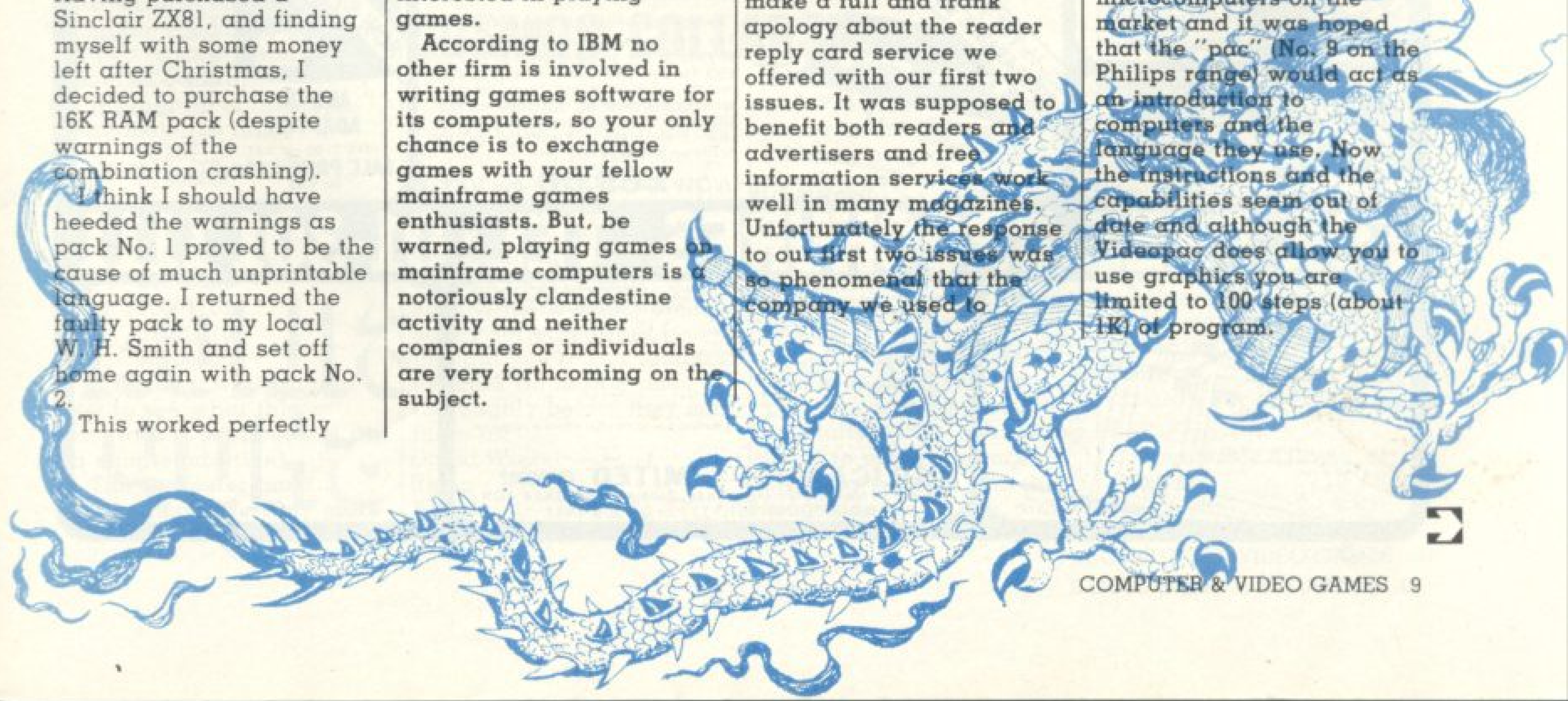
Finally, there are plans for Commodore to bring out a VIC-40 computer which will have double the amount of characters of the current VIC. It may be introduced to the U.K. later this year.

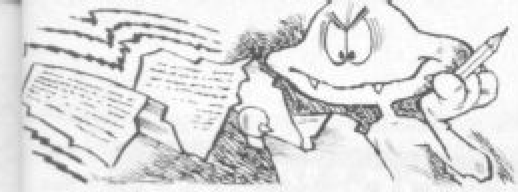
PHILIPS' "MICRO" PAC

Dear Sir,
I am the owner of a Philips G7000 Videopac computer, and I would like some information on which cartridge is supposed to turn your Videopac into a home computer, instead of a T.V. game. The two questions I have to ask are: is the game programmable to such games as Adventure, Space Invaders etc.

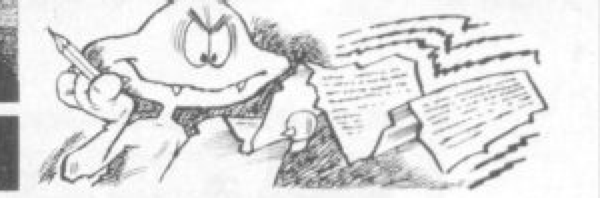
Paul Owens
Wishaw
Strathclyde
Scotland

Editor's reply: The Videopac Computer cartridge was brought out when Philips first launched the G7000 two years ago. Then there were fewer microcomputers on the market and it was hoped that the "pac" (No. 9 on the Philips range) would act as an introduction to computers and the language they use. Now the instructions and the capabilities seem out of date and although the Videopac does allow you to use graphics you are limited to 100 steps (about 1K) of program.





MAILBAG



CASE FOR DECODING

Dear Sir,
In last month's issue of *Computer and Video Games* I read in one of the articles that games programs written in machine code are better than games written in any other language because they are faster.

I don't know much about how computers work and wondered if you could explain how machine code works and why all games are not written in it.

Frank Gree
Godalming
Surrey

Editor's reply: Machine language is difficult to use. It's all right for machine to machine communication but not for man-machine communication. It is possible to group the binary coded words together so that each step in the program can be represented by a word, or mnemonic, describing that operation. This is called mnemonic machine code.

Machine language is the most primitive programming language from the human point of view, but it is the only language which the computer can really understand. The manufacturer of a particular processor provides the user with a set of instructions. Each instruction relates to the operation required. The instructions may be quite simple: to add the contents of two registers and place them in a third.

A program of this type may look like this:

```
10101101
01000000
00000000
01101101
01000001
00000000
10001101
01000010
00000000
```

It needs a well-trained eye to see what this program is supposed to do: (a simple addition).

The computer must perform considerably more complex operations than this, which makes it extremely inconvenient to program in machine code.

One way of simplifying the machine language is to equip the computer with a small conversion program to translate the binary figures into hexadecimal code. The program example given above will then read like this: AD, 40, 00, 6D, 41, 00, 8D, 42, 00.

The programmer can make life a bit easier for himself by assigning a mnemonic to each hex. byte. For example, the instruction "load the contents of memory address xxxx into the accumulator" could be written as LDA XXXX instead of AD XXXX. This type of machine code programming still needs the programmer to know the address location of the data and instructions.

Our program now becomes:

LDA 0040	**i.e. load accumulator with contents of 0040**
ADC 0041	**i.e. add contents of address 0041 to number in accumulator**
STA 0042	**i.e. store result in 0042**

The programmer has to know that the first number is in address 0040, the second in 0041 and that the answer will be found in 0042.

High-level languages are oriented towards the user and his problems rather than to the machine. A high-level language is comparatively easy to learn and relatively simple to read and write.

A simple addition in Basic, for instance, is written on a single line: LET C = A + B.

Programming in a high-level language is very efficient as far as programming time is concerned. It is normally reckoned to be at least three to five times as quick as assembler programming.

On the other hand, high-level languages make for less efficient use of the computer's speed and storage capacity.

Programs written in high-level language generally require 50%-300% greater storage capacity than those written in assembly language or machine code.



COSMOS COLLAPSE

Dear Sir,
A marvellous magazine, but I spotted several errors in your Sinclair Cosmos Landing program. For example there is no GOSUB 2000 referred to in line 8 and line 535 has a surplus GOTO in it.
Luckily these errors are easily sorted out but I thought you asked readers to check through games thoroughly before they sent them in?

David Wiel
Ripon
Yorks

Editor's reply: Lines 8, 535 and 570 all suffered from errors in the Cosmos Landing program. They should read:

```
8 IF INKEY $ = "Y" THEN
GOSUB 585
535 IF W 1 AND W 4 THEN
PRINT D$
570 IF INKEY $ = " " THEN
GOTO 570
```

Can I repeat requests that readers check their program listings through carefully before submitting them to prevent errors slipping through into the magazine.

REMEMBER THE REMS

Dear Sir,
I am writing to endorse the request of Mr B. A. Moore in the December issue of your excellent (so far) magazine for rather more explanatory matter in the write-up of the programs you publish or, alternatively, more "REMs" in the program listings themselves — these latter may always be edited out when entering the program in one's own machine.

I would also mention that it is not usually the Basic dialects which prove difficult — after all, if one sees "CLS" in a listing the meaning is rather obvious, even though it may not be contained in one's own version.

Also I would venture to bring to your notice the excellent *Basic Handbook* by David A. Lien, the preface to which states that the handbook addresses the problem of Basic programs which, after entering, will not run on one's own computer by: "discussing in detail every commonly used Basic Statement, Function, Operator and Command." In my opinion this claim is fully justified.

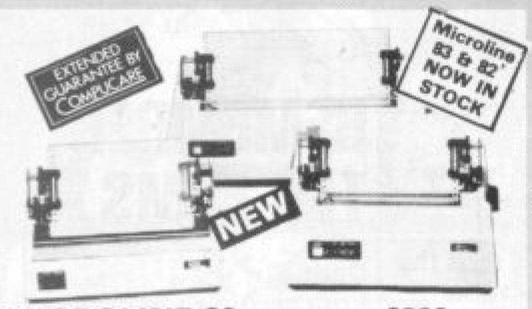
The real problem when transferring programs from one machine to another arises from the use of "Peek", "Poke" and "Call" commands.

I realise that the provision of both explanatory matter and "REMs" lies in the hands of your contributors, and you cannot print what is not included in the submission to you, but it is so frustrating to see an interesting program which one cannot use because it is liberally spattered with "Peek" and "Poke" various numbers into various addresses that perhaps you could make a special appeal to everyone thinking of sending in a program for publication.

L. S. Ford
Summerlands Close
Brixham
Devon

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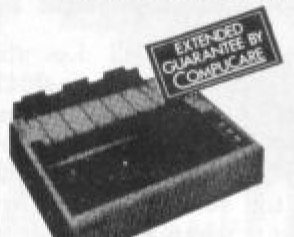
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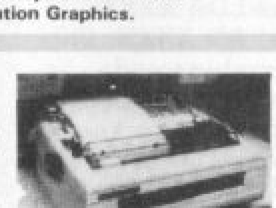
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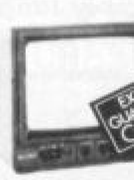
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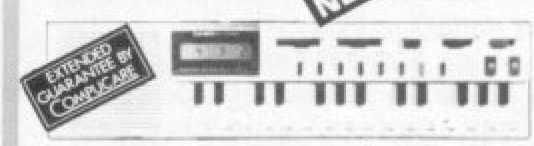


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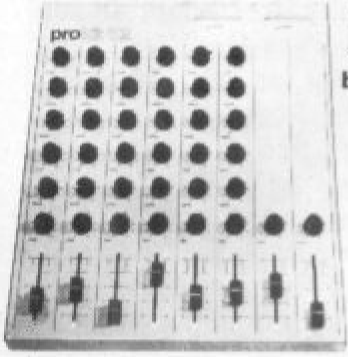
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HUW KNOWS HIS WAY AROUND THE MACHINES

Instantly recognising the numerous creatures featured in arcade games is a daunting task even for the most addicted player.

But Huw Roberts of Maidenhead has got his finger on the pulse when it comes to creatures. Huw emerged the winner of our Know Your Creatures competition by correctly identifying eight of the nine creatures we asked you to name.

No-one managed to name all nine creatures correctly but our thanks and commiserations go to everybody who took part.

"At the moment I'm keen on playing Galaxians and Mooncresta but on average only spend about 20p a week in the arcades," said 18-year-old Huw.

"I worked out what the creatures were by playing the games myself and also spent a lot of time watching other people playing."

What he really likes about arcade games is converting them to run on his own computer, an Exidy Sorcerer, or his school's Research Machines 380Z. "I really like to watch other people play and try writing my own versions," he added.

He has been playing arcade games for about four or five years ever since the original bat and ball games were introduced. "Ever since Space Invaders came out I've kept reasonably well up on the new developments."

His top scores to date are 48,000 on Mooncresta and 17,000 on Galaxian. They bring out the aggressive streak in him: "I like the fact that you can kill things! But also because you can keep increasing your score and bettering your own experience."

He's hoping his Taito Electronics Space Invader table will grace his parents' lounge when it is delivered.

Huw thought quite a few of the creatures we posed in the competition were obvious. But four of them caused him problems. Galaxian was the little beast that made him slip up, and he guessed at two of the creatures, the Wizard of Wor, and Space Fury.

Already with O level computing under his belt he has a place at Cambridge University to study computing at the end of this year.

MEET OUR TOP ARCADE

Asteroids expert Peter Edmonds, took on the best in the arcade world and came second last month.

Only world snooker champion Steve Davis could beat Peter's score on the deciding game of Qix. But by that time, Peter had already been heralded as Britain's top arcade player.

In conjunction with Taito Electronics, *Computer & Video Games* magazine organised the Best Arcade Player finals at the Embassy Club in London's West End. Nine finalists who could prove their top scores on Britain's three most popular machines travelled down from all over the country to compete for the title on January 26th.

But it was the finalist with the shortest journey, 18-year-old Peter from Whitton in Middlesex who came away with the prize, his favourite arcade machine, Asteroids, generously donated by Taito.



Steve Davis concentrating on Qix

Unemployed Peter plays mostly in his local Whitton pubs. "I like playing where there is an atmosphere. It's not beating the machine I like, but beating my mates."

Before the actual final Peter hadn't played Asteroids for a couple of weeks and he put his win down to the fact: "I was the only one not wearing a *Computer and Video Games* T-Shirt."

He usually plays arcade games a couple of hours a day and is now concentrating on perfecting his Defender technique.

After being beaten by Steve Davis in the specially arranged play-off between the champions, Peter admitted that he may not have put as much effort into that as he had the earlier rounds: "After all the competition proper was over then."

And Steve Davis was generous in his victory, confessing that he had played the new Qix machine "about 50 times" before this competition.

Steve is often seen relaxing between televised snooker competitons by playing arcade games, and his favourite one is Defender. "I use them just to mess about with during the sessions," he said.

"I find them very relaxing even though if you watch 90% of the players you'll see their feet twitching which can be very amusing.

"They are a form of competition but it doesn't really matter if you get blown up."

Steve found the Qix game an interesting and original concept: "It's certainly a different idea to most of them. But it's timing and co-ordination that is vital in all these games."

Steve put his victory down to the fact that he had just come in "fresh as a daisy", while Peter had been competing since the early morning.



Steve Davis presents champ Peter Edmonds with his rosette

PLAYER

The Qix machine has already proved very popular in America and was launched in Britain at the Amusements Trade Exhibition on January 18.

It is a game of space capture with the player taking the part of a drawing line which can fill in areas of the screen. But every time he leaves the borders of the screen he has to be careful to avoid the Qix — a deadly moving spark which patrols the open space on the screen.

If 70% of the screen is filled a new screen is conjured up.

Play began early that morning with the nine finalists practising on their respective machines.

But the competition proper began with the 100s of entries we received from arcade game players from all over the country, who gave us their highest scores on their favourite machines. Asteroids and Defender were undoubtedly the most popular.

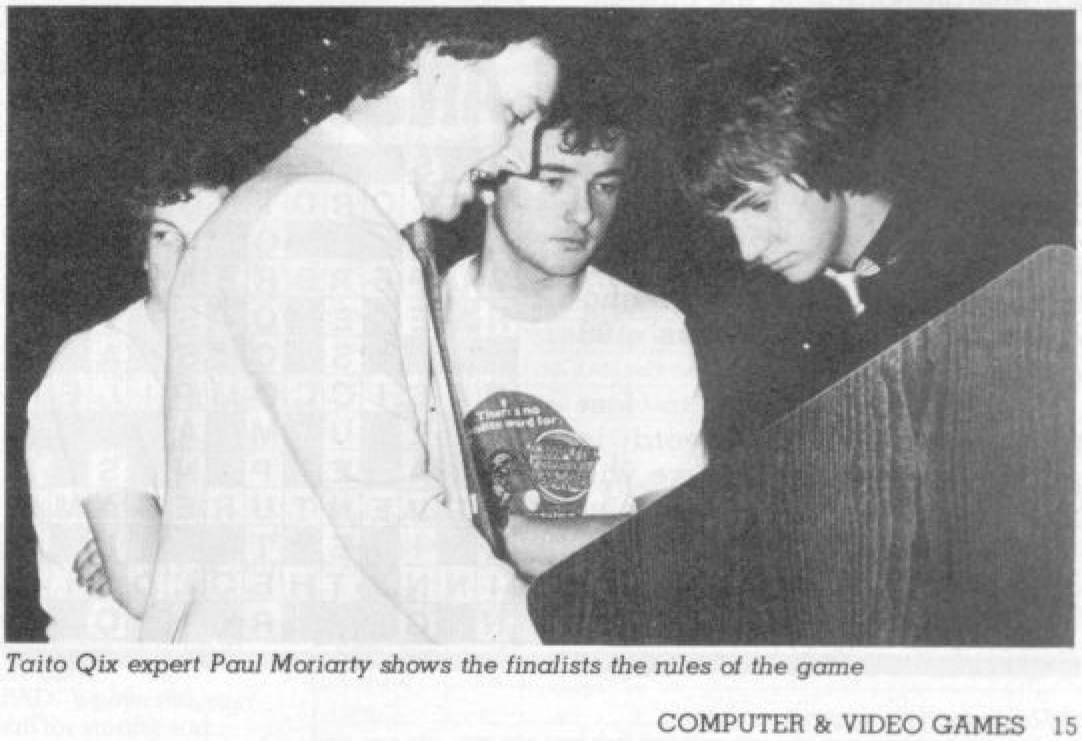
Pacman came a narrow third, just in front of Scramble and Moon Cresta, and the high scorers in these two brackets were very unlucky not to be included in the finals.

Beccuse all the Defender and Asteroids finalists had already proved they can stay on the machine almost indefinitely and the Pacman finalists were capable of scoring over 300,000, it was decided to limit each player to 15 minutes on their chosen machine and the winner would be the one with the highest score after that time.

Peter was joined in the final proper by Christopher Jackson and Stephen Mainwaring. Taito expert Paul Moriarty showed the three how to play the Qix machine and gave them some tips.

Because it is difficult for even good players to stay on Qix for very long, each finalist was given five minutes' play and the best score after that period counted. Peter came out on top with 21,988 and after the nine finalists had been presented with their trophies by Steve Davis, Peter and Steve tangled in the final match of the morning.

Steve won the final battle with a score of 18,856 on the Qix machine.



Taito Qix expert Paul Moriarty shows the finalists the rules of the game

THE NINE FINALISTS

The Embassy Club was alive with the sound of bleeping and buzzing machines and the sight of frantic fingers pushing buttons and pulling levers as the nine finalists battled it out.

Each contender had five minutes' practice play before they went through 15 minutes of tense, competitive play.

The winner from the three Asteroids contestants was Peter Edmonds who achieved a high score of 129,610. Runner-up was Vincent Mulholland of Buckhurst Hill, who plays in Tots 'n' Toys and scored 58,410, while Karl Booth a regular on the Gipton Hotel's machine in Leeds came third with 8,750 points.

The Defender champion was Christopher Jackson, a familiar face at Funland in Bridlington, who went through to the semi-finals with 104,000 points. He beat Richard Carr who scored 85,575 after hours of practice at the Scarborough Casino. David Ross from the Isle of Wight notched up 54,250. His arcade haunt is Southsea's Jubilee Clarence Parade.

Stephen Mainwaring of Swansea perfected his technique at Pompa's Café and reached the finals with the top Pacman score of 43,200. Runner-up was the only girl to reach the final line up, Karla Stirzaker from Fleetwood, Lancs. She amassed 37,960 after qualifying at her local Church Army Youth Club.

Third in the Pacman contingent was Michael Cygan from Derby. Michael's final score was 28,730 after practising in Kathy's Arcade in his home town.

COMPETITION

OUR WINNERS DON'T HAVE LONG TO WAIT

Next month the three winners who managed to solve the free Octagon puzzle we put on the cover of the very first issue of *Computer and Video Games* will be announced.

When the closing date of the competition had crept upon us our office was swamped with entries and anxious telephone calls from entrants making sure the post hadn't delayed the arrival of their entries.

Getting on for 1,000 people submitted a solution to the "beer mat" puzzle hence the delay in choosing the three winners of the VIC-20 computers. These are now in the process of being sorted and tested, a mammoth task for those involved.

But by February 15 our judges will have found the three programs which met the criteria laid down.

Generally the standard of the programs submitted was good. They covered a variety of computers ranging from the Sinclair ZX81 at the micro end through to the DEC PDP/11 representing mini-computers, and up to a mainframe ICL computer.

Sinclair owners were keen to upgrade their machine to a VIC-20 and accounted for the largest proportion of the entries.

Following a close joint second were solutions programmed for the Sharp MZ80K and the Tandy TRS-80 with the Acorn Atom the fourth most popular machine.

Many people obviously spent a lot of time and effort not only writing a program to match the sides of the puzzle, but also in presenting it. Some entrants included additional documentation with flow charts, instructions, diagrams and photographs.

The final decision rests on the quality itself, whether or not there are any bugs in it and the quality of the programming.

GET AN EYEFUL OF THIS TOWER—ON US!



The delights of Paris are waiting for you. That's the prize up for grabs if a program listing you send to us at Computer and Video Games is judged to be the best of the year.

Not only will you spend a weekend in Paris — and you can take a friend too — but we will also fill your pockets with money.

October is the month when our panel of judges will put their heads together to find the winning listing. Each listing submitted will be thoroughly played and tested by the judges taking into account the originality of the game, the use of the facilities offered by that particular computer, playability, presentation and skill in programming.

No matter what computer you have written the game for, or how old you are, you can enter the competition and stand the chance of being named best programmer. All entries are valid until October so you've still got seven months to knock out a games program good enough to put you on a plane to Paris.

BRAINWARE ANSWERS

The answer to our February Mind Routines is that 73, 74 and 75 are the lowest 3 consecutive integers whose factorials contain the digits 0-9 in ascending order. (73 factorial has 106 digits).

The correct solution to last month's Nevera Crossword is printed on the right and we will publish the names of the winners next month.

Turn to page 79 for this month's Brainware problems.

1 C	■	2 S	■	■	■	3 M	■	■	■	4 R	■	5 P
6 R	E	C	O	R	D	I	N	7 G	■	8 E	E	L
A	■	O	■	■	■	C	■	L	■	M	■	O
9 S	U	P	E	10 R	B	R	E	A	K	O	U	T
H	■	E	■	E	■	O	■	S	■	V	■	T
■	■	■	■	S	■	C	■	S	■	A	■	E
11 B	A	12 S	I	C	C	O	M	P	I	L	E	R
R	■	L	■	U	■	M	■	A	■	■	■	■
E	■	A	■	E	■	P	■	N	■	13 S	■	14 P
15 A	D	V	E	N	T	U	R	E	G	A	M	E
K	■	I	■	E	■	T	■	■	■	L	■	N
16 I	N	N	■	17 T	H	E	O	L	D	V	I	C
N	■	G	■	■	■	R	■	■	■	O	■	E

COMPUTER & VIDEO GAMES' free competitions are open to anyone except EMAP employees and their relatives.

Entries to our Mind Routines, Nevera Crossword, Know your Creatures, Game of the Year and Arcade Player of the World competitions, should be sent to COMPUTER & VIDEO GAMES, Durrant House, 8 Herbal Hill, London EC1R 5JB. Judges' decisions are final and no correspondence can be entered into.

Send entries to Mind Routines on a postcard and in all cases please include a name, address and, where possible, a telephone number.

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Although primarily designed for the Sinclair ZX81, many of the cassettes are suitable for running on a Sinclair ZX80 – if fitted with a replacement 8K BASIC ROM.

Some of the more elaborate programs can be run only on a Sinclair ZX Personal Computer augmented by a 16K-byte add-on RAM pack.

This RAM pack and the replacement ROM are described below. And the description of each cassette makes it clear what hardware is required.

8K BASIC ROM

The 8K BASIC ROM used in the ZX81 is available to ZX80 owners as a drop-in replacement chip. With the exception of animated graphics, all the advanced features of the ZX81 are now available on a ZX80 – including the ability to run much of the Sinclair ZX Software.

The ROM chip comes with a new keyboard template, which can be overlaid on the existing keyboard in minutes, and a new operating manual.

16K-BYTE RAM pack

The 16K-byte RAM pack provides 16-times more memory in one complete module. Compatible with the ZX81 *and* the ZX80, it can be used for program storage or as a database.

The RAM pack simply plugs into the existing expansion port on the rear of a Sinclair ZX Personal Computer.



Cassette 1 – Games

For ZX81 (and ZX80 with 8K BASIC ROM)

ORBIT – your space craft's mission is to pick up a very valuable cargo that's in orbit around a star.

SNIPER – you're surrounded by 40 of the enemy. How quickly can you spot and shoot them when they appear?

METEORS – your starship is cruising through space when you meet a meteor storm. How long can you dodge the deadly danger?

LIFE – J. H. Conway's 'Game of Life' has achieved tremendous popularity in the computing world. Study the life, death and evolution patterns of cells.

WOLFPACK – your naval destroyer is on a submarine hunt. The depth charges are armed, but must be fired with precision.

GOLF – what's your handicap? It's a tricky course but you control the strength of your shots.

Cassette 2 – Junior Education: 7-11-year-olds

For ZX81 with 16K RAM pack

CRASH – simple addition – with the added attraction of a car crash if you get it wrong.

MULTIPLY – long multiplication with five levels of difficulty. If the answer's wrong – the solution is explained.

TRAIN – multiplication tests against the computer. The winner's train reaches the station first.

FRACTIONS – fractions explained at three levels of difficulty. A ten-question test completes the program.

ADDSUB – addition and subtraction with three levels of difficulty. Again, wrong answers are followed by an explanation.

DIVISION – with five levels of difficulty. Mistakes are explained graphically, and a running score is displayed.

SPELLING – up to 500 words over five levels of difficulty. You can even change the words yourself.

Cassette 3 – Business and Household

For ZX81 (and ZX80 with 8K BASIC ROM) with 16K RAM pack

TELEPHONE – set up your own computerised telephone directory and address book. Changes, additions and deletions of up to 50 entries are easy.

NOTE PAD – a powerful, easy-to-run system for storing and retrieving everyday information. Use it as a diary, a catalogue, a reminder system, or a directory.

BANK ACCOUNT – a sophisticated financial recording system with comprehensive documentation. Use it at home to keep track of 'where the money goes,' and at work for expenses, departmental budgets, etc.

Cassette 4 – Games

For ZX81 (and ZX80 with 8K BASIC ROM) and 16K RAM pack

LUNAR LANDING – bring the lunar module down from orbit to a soft landing. You control attitude and orbital direction – but watch the fuel gauge! The screen displays your flight status – digitally and graphically.

TWENTYONE – a dice version of Blackjack.

COMBAT – you're on a suicide space mission. You have only 12 missiles but the aliens have unlimited strength. Can you take 12 of them with you?

SUBSTRIKE – on patrol, your frigate detects a pack of 10 enemy subs. Can you depth-charge them before they torpedo you?

CODEBREAKER – the computer thinks of a 4-digit number which you have to guess in up to 10 tries. The logical approach is best!

MAYDAY – in answer to a distress call, you've narrowed down the search area to 343 cubic kilometers of deep space. Can you find the astronaut before his life-support system fails in 10 hours time?

Cassette 5 – Junior Education: 9-11-year-olds

For ZX81 (and ZX80 with 8K BASIC ROM)

MATHS – tests arithmetic with three levels of difficulty, and gives your score out of 10.

BALANCE – tests understanding of levers/fulcrum theory with a series of graphic examples.

VOLUMES – 'yes' or 'no' answers from the computer to a series of cube volume calculations.

AVERAGES – what's the average height of your class? The average shoe size of your family? The average pocket money of your friends? The computer plots a bar chart, and distinguishes MEAN from MEDIAN.

BASES – convert from decimal (base 10) to other bases of your choice in the range 2 to 9.

TEMP – Volumes, temperatures – and their combinations.

How to order

Simply use the order form below, and either enclose a cheque or give us the number of your Access, Barclaycard or Trustcard account. Please allow 28 days for delivery. 14-day money-back option.

sinclair ZX SOFTWARE

Sinclair Research Ltd, 6 Kings Parade, Cambridge, Cambs., CB2 1SN. Tel: 0276 66104.

To: Sinclair Research, FREEPOST 7, Cambridge, CB2 1YY *Please print*

Please send me the items I have indicated below.

Qty	Code	Item	Item price	Total
	21	Cassette 1 – Games	£3.95	
	22	Cassette 2 – Junior Education	£3.95	
	23	Cassette 3 – Business and Household	£3.95	
	24	Cassette 4 – Games	£3.95	
	25	Cassette 5 – Junior Education	£3.95	
	17	*8K BASIC ROM for ZX80	£19.95	
	18	*16K RAM pack for ZX81 and ZX80	£49.95	
	.	*Post and packing (if applicable)	£2.95	
			Total £	

*Please add £2.95 to total order value **only** if ordering ROM and/or RAM.

I enclose a cheque/PO to Sinclair Research Ltd for £________

Please charge my Access*/Barclaycard/Trustcard no.

**Please delete as applicable.*

Name: Mr/Mrs/Miss

Address:

CVG03

Sinclair ZX81 Personal Comp[uter] the heart of a system that grows with you.



1980 saw a genuine breakthrough – the Sinclair ZX80, world's first complete personal computer for under £100. Not surprisingly, over 50,000 were sold.

In March 1981, the Sinclair lead increased dramatically. For just £69.95 the Sinclair ZX81 offers even more advanced facilities at an even lower price. Initially, even we were surprised by the demand – over 50,000 in the first 3 months!

Today, the Sinclair ZX81 is the heart of a computer system. You can add 16-times more memory with the ZX RAM pack. The ZX Printer offers an unbeatable combination of performance and price. And the ZX Software library is growing every day.

Lower price: higher capability
With the ZX81, it's still very simple to teach yourself computing, but the ZX81 packs even greater working capability than the ZX80.

It uses the same micro-processor, but incorporates a new, more powerful 8K BASIC ROM – the 'trained intelligence' of the computer. This chip works in decimals, handles logs and trig, allows you to plot graphs, and builds up animated displays.

And the ZX81 incorporates other operation refinements – the facility to load and save named programs on cassette, for example, *and* to drive the new ZX Printer.



Every ZX81 comes with a comprehensive, specially-written manual – a complete course in BASIC programming, from first principles to complex programs.

Kit: £49.95

Higher specification, lower price – how's it done?
Quite simply, by design. The ZX80 reduced the chips in a working computer from 40 or so, to 21. The ZX81 reduces the 21 to 4!

The secret lies in a totally new master chip. Designed by Sinclair and custom-built in Britain, this unique chip replaces 18 chips from the ZX80!

New, improved specification
- Z80A micro-processor – new faster version of the famous Z80 chip, widely recognised as the best ever made.
- Unique 'one-touch' key word entry: the ZX81 eliminates a great deal of tiresome typing. Key words (RUN, LIST, PRINT, etc.) have their own single-key entry.
- Unique syntax-check and report codes identify programming errors immediately.
- Full range of mathematical and scientific functions accurate to eight decimal places.
- Graph-drawing and animated-display facilities.
- Multi-dimensional string and numerical arrays.
- Up to 26 FOR/NEXT loops.
- Randomise function – useful for games as well as serious applications.
- Cassette LOAD and SAVE with named programs.
- 1K-byte RAM expandable to 16K bytes with Sinclair RAM pack.
- Able to drive the new Sinclair printer.
- Advanced 4-chip design: micro-processor, ROM, RAM, plus master chip – unique, custom-built chip replacing 18 ZX80 chips.

Built: £69.95

Kit or built – it's up to you!
You'll be surprised how easy the ZX81 kit is to build: just four chips to assemble (plus, of course the other discrete components) – a few hours' work with a fine-tipped soldering iron. And you may already have a suitable mains adaptor – 600 mA at 9 V DC nominal unregulated (supplied with built version).

Kit and built versions come complete with all leads to connect to your TV (colour or black and white) and cassette recorder.



puter-



Available now- the ZX Printer for only £49.95

Designed exclusively for use with the ZX81 (and ZX80 with 8K BASIC ROM), the printer offers full alpha-numerics *and* highly sophisticated graphics.

A special feature is COPY, which prints out exactly what is on the whole TV screen without the need for further intructions.

At last you can have a hard copy of your program listings – particularly useful when writing or editing programs.

And of course you can print out your results for permanent records or sending to a friend.

Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your computer – using a stackable connector so you *can* plug in a RAM pack as well. A roll of paper (65 ft long x 4 in wide) is supplied, along with full instructions.

16K-byte RAM pack for massive add-on memory.

Designed as a complete module to fit your Sinclair ZX80 or ZX81, the RAM pack simply plugs into the existing expansion port at the rear of the computer to multiply your data/program storage by 16!

Use it for long and complex programs or as a personal database. Yet it costs as little as half the price of competitive additional memory.

With the RAM pack, you can also run some of the more sophisticated ZX Software – the Business & Household management systems for example.

How to order your ZX81

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day.

BY FREEPOST – use the no-stamp-needed coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research Ltd, FREEPOST 7, Cambridge, CB2 1YY. **Order**

Qty	Item	Code	Item price £	Total £
	Sinclair ZX81 Personal Computer kit(s). Price includes ZX81 BASIC manual, excludes mains adaptor.	12	49.95	
	Ready-assembled Sinclair ZX81 Personal Computer(s). Price includes ZX81 BASIC manual and mains adaptor.	11	69.95	
	Mains Adaptor(s) (600 mA at 9 V DC nominal unregulated).	10	8.95	
	16K-BYTE RAM pack.	18	49.95	
	Sinclair ZX Printer.	27	49.95	
	8K BASIC ROM to fit ZX80.	17	19.95	
	Post and Packing.			2.95

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GAMES NEWS

TUMBLEWEED AND THE MORGS

TOMBSTONE CITY

There's a far-off planet with a desert atmosphere where plants procreate and turn into vicious creatures which devour any outworld visitors.

You are stuck in that desert, in command of a schooner which is equipped with laser guns capable of widespread obliteration. A protective field is your only safeguard.

Two types of evil creature inhabit Tombstone City. The Pink Tumbleweed and the green coloured Morg.

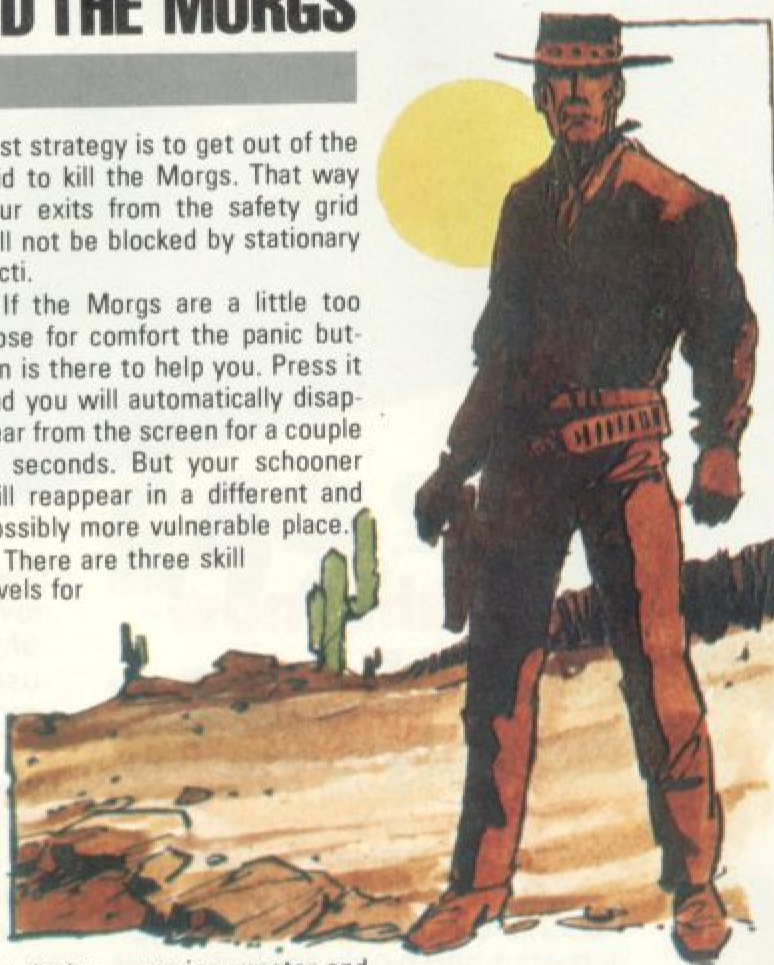
Scattered around the infertile sands are Cacti and even they are harmful. When the top of the plant turns white it is a warning that it is on the verge of changing into a Morg.

The Morgs move around the perimeter of your safety grid, represented by blue coloured squares. Between each square is a path which you can travel along, or aim your guns between to blast a green Morg.

When you fire your guns at a Morg and score a direct hit they instantly transform into cactus plants. It's a vicious circle. The best strategy is to get out of the grid to kill the Morgs. That way your exits from the safety grid will not be blocked by stationary cacti.

If the Morgs are a little too close for comfort the panic button is there to help you. Press it and you will automatically disappear from the screen for a couple of seconds. But your schooner will reappear in a different and possibly more vulnerable place.

There are three skill levels for you to try — novice, master and insane. The game is difficult, but that in itself makes it compulsive and you will want to keep playing until you have mastered the strategy.



Texas Instruments is the brain behind this new game which has been developed to run on a T.I. 99/4A. Cartridges should retail at around £20.

BATTLE FOR THE SUEZ CANAL

SOUTHERN COMMAND

Put yourself under pressure taking charge of an Israeli commando unit during the October war of 1973.

As an Israeli commander you must smash enemy camps and cross the Suez Canal to establish a bridgehead for your side.

Your country's airforce is at your disposal too to put down Egyptian resistance.

This new wargame is called Southern Command running on an Apple II with 48K.

With the game comes a comprehensive instruction book detailing how to play the game, which keys to use and giving hints for the best strategic plans to take. The book also contains various historical scenes which you can re-enact on the computer. It's essential to read the book thoroughly to get the best out of the game, and at £24.95 it's worth spending time doing so.

Richmond based SBD Software is the U.K. supplier.

LIFE, DON'T TALK TO ME ABOUT LIFE...

LOVE AND DEATH

Complete an entire life cycle from conception to death in this amusing adult game with the apt name Love and Death.

ZX81 1K owners should get to grips with this game for a few entertaining hours in which you travel through every stage of life. To bring an extra smile to your face listen to the cassette playing an amusing soundtrack which adds flavour to the game.

It begins with the Seduction, the first game and you can guess what it's about! By suggesting "doing verbs" to the computer corresponding to various parts of the anatomy pictured on the screen, the seduction of a woman takes place.

Next you will see yourself as a father figure and want to bring your own son into the world — no easy task this — but if all goes well you can move on to the next game, Birth.

If you can manage to bring a child into the world unaided the game is really on. Your offspring has already been named for you — Rubic's Pube. It's up to you to make sure he grows into a fine specimen of a man by building up the chromosomes in his body.

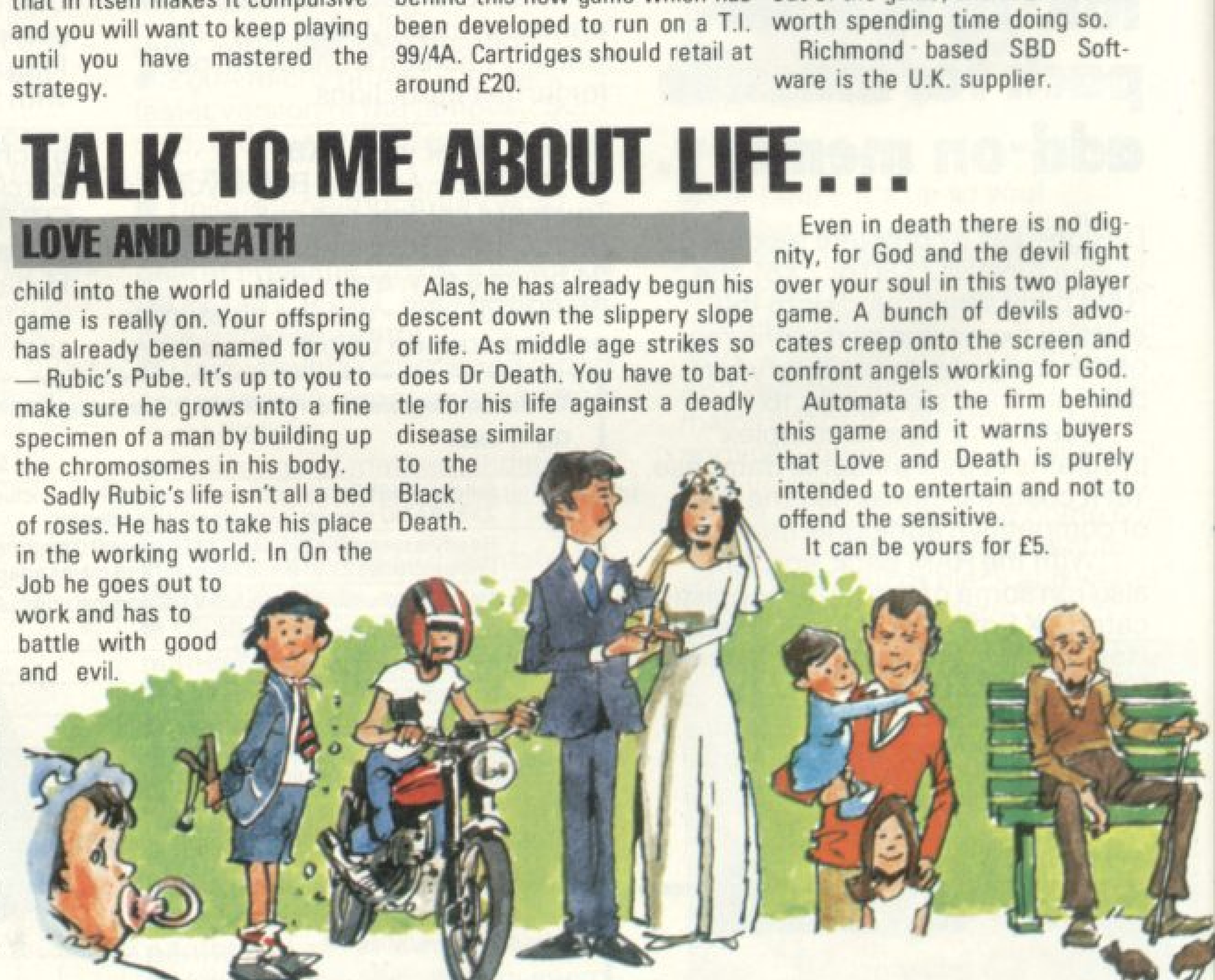
Sadly Rubic's life isn't all a bed of roses. He has to take his place in the working world. In On the Job he goes out to work and has to battle with good and evil.

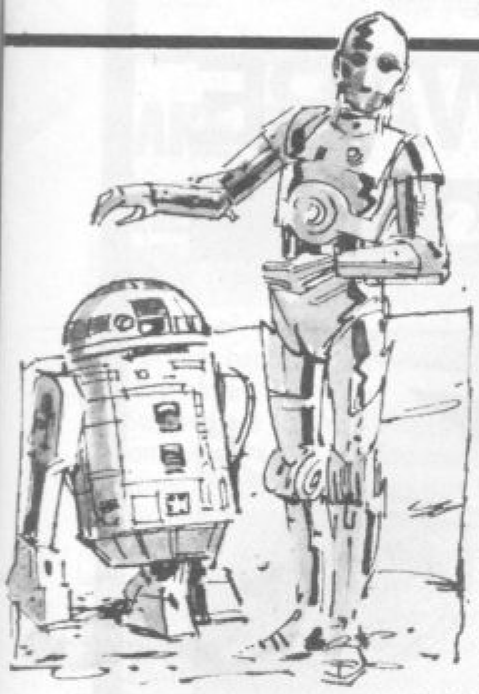
Alas, he has already begun his descent down the slippery slope of life. As middle age strikes so does Dr Death. You have to battle for his life against a deadly disease similar to the Black Death.

Even in death there is no dignity, for God and the devil fight over your soul in this two player game. A bunch of devils advocates creep onto the screen and confront angels working for God.

Automata is the firm behind this game and it warns buyers that Love and Death is purely intended to entertain and not to offend the sensitive.

It can be yours for £5.





IN LUKE'S KINGDOM

STAR WARS

In the movie **Star Wars**, Luke Skywalker's life was one long conflict with the Empire's hoary voiced leader Darth Vadar.

In this new **Star Wars** adventure — which runs on a Nascom 2 with 32K memory — you assume the role of Luke and kick the game off by creating a 100 quadrant galaxy which contains 72,000 cells and a multitude of stars.

Once the various robots, starships and planets have been randomly placed in the galaxy by the computer, the battle begins.

Your object is to locate and destroy the Empire's giant headquarters — the Death Star.

But before you attempt that you have to rescue the Princess Leia from the clutches of cruel Darth Vadar.

On your way there is plenty of action. From space battles with Empire forces, collecting R2D2, the astro-droid and C3PO, the well spoken humanoid robot, to rescuing Princess Leia and killing Darth Vadar for the good of mankind.

To help you in your space quest you have some of the most advanced equipment on your ship providing you with information about your current situation and giving you help and guidance on your mission.

At your disposal are a variety of sophisticated weapons including a turbo laser cannon, twist beams and laser pulses, plus force fields and energy absorbing shields for your ship's protection.

If you succeed in completing each mission given you get the chance to fly your X-wing starfighter down the Death Star's Trench. But it is a risky and dangerous task and one, suitable only for expert starfighter pilots.

While under heavy bombardment from enemy fire you have to navigate your X-wing down the Trench and aim for the weak spots.

Absolute accuracy is vital to your success and you must judge the exact moment to release a Photon bomb to wipe out the Death Star.

Star Wars is a product of Chelmsford based Futura Software making use of real time graphics and machine code programming for extra fast action, and it costs £10.

BATTLE OF THE PLANETS

AIRSTRIKE

Inter-planet feudal warfare is raging and as chief in command of the galactic space cruiser force you direct all craft in a bid to fend off enemy beings.

But the territory in which you and your space fleet are fighting is uncharted. You are flying blind.

Your only aid is your radar on which the horizon unfolds seconds before you fly over the terrain.

Missiles are fired at you from all sides. On the ground are bases which you must destroy — if you don't there's a chance they will shoot you down. Enemy craft litter the sky, constantly blasting your ship with lethal laser fire.

Fortunately your unique space cruiser has ample ammunition facilities. You can open your holds to drop bombs on craft flying below you or on ground stations. Or you can make use of your laser guns fitted to the front and back of your vessel.

The horizon is not straightforward. There are mountains which appear suddenly in front of you, and which occasionally develop into narrow tunnels through which you must navigate your ship.

Airstrike has been developed for the Atari 400 and requires 16K memory capacity. It comes in either cassette or disc form. Gemini Electronics is the supplier and the price is £15.95 for tape and £18.95 for disc.

RUBBISH FROM SPACE

SPACE DEBRIS

Space Debris is almost the reverse of Space Invaders. The green meanies remain in banks at the top of the screen and you are forced to move your firing ship upwards, instead of the aliens gradually moving down towards you.

What forces your firing base to fly into the meanies' close range is the debris. If you let one of the little devils escape your laser fire, when it hits the ground you'll find it transforms into a piece of debris. You must shoot them down before they build up into too much rubbish, blocking your flight path. If you get a direct hit you score points.

Space Debris was written for a Pet computer by software specialists Supersoft of Harrow. The price is £8 plus VAT.

MARAUDING INVADERS

RED ALERT

Your civilisation is at red alert under threat from a race of marauding invaders intent on destroying all your planet's defence sites.

It's literally Red Alert as you leap to action stations to save your people. Amongst your weapons are two multi barrelled precision cambered meanie blasters, one ultra sensitive wide range multi frequency radar, one government surplus anti-thud rocket,

The meanies fill the night sky, constantly firing missiles at the surface of your planet. Move your radar sights close to the marauders and press the space bar to zap them into oblivion.

If the creatures blow up your two meanie blasters you lose the game. The best strategy is to protect your radar from destruction to achieve a high score.

Red Alert runs on Apple II computers and requires 48K memory space. Copies can be bought from SBD Software of Richmond for £16.95.

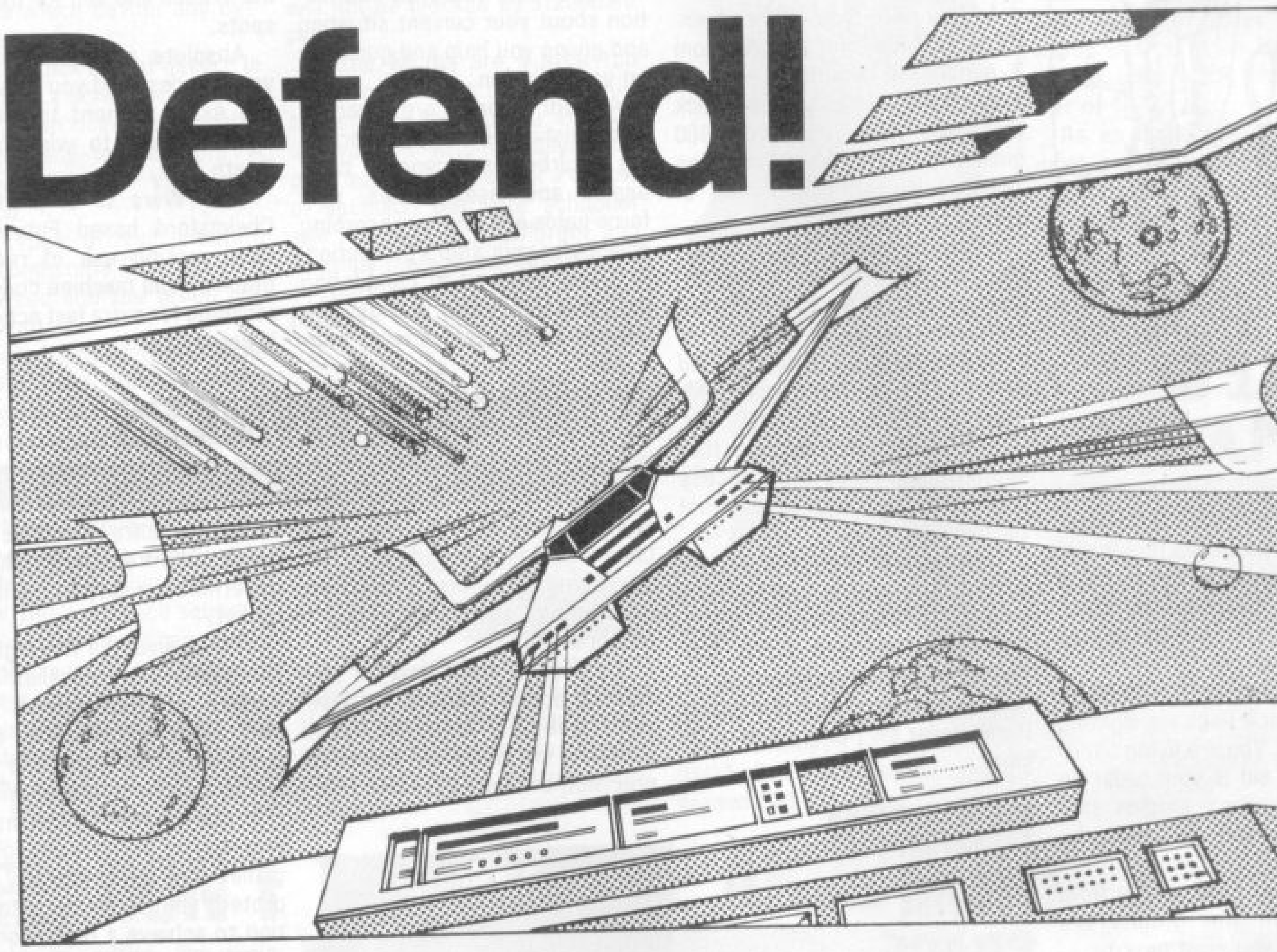


INNOVATIVE

TRS 80-GENIE SOFTWARE

from the professionals

Defend!



First there was Invaders, then came Asteroids, and now DEFEND!!!

Carrying on in the same tradition, Defend is a fast arcade type action game, complete with sound effects. Enemy spaceships come at you fast and furiously. If you succeed in shooting them down before they get your ships, you must still get yourself through a meteor shower (but at least they don't shoot at you) and finally, if you emerge unscathed, you must navigate a tunnel in order to get yourself completely out of danger. An enthralling game with excellent graphics, personalisation of highest scores and points bonuses. One of its best features is the "crisp" and immediate control the player has over the manoeuvreability of his ship which includes diagonal movement. Machine language, of course, for speed. A matter of taste, but we think it beats Invaders and Asteroids. Suitable for TRS-80 Models I and III and all Genie models.

Tape (16K) .... £13.00 + V.A.T. = **£14.95**
Disk .... £16.00 + V.A.T. = **£18.40**

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TRS-80 & VIDEO GENIE SOFTWARE CATALOGUE £1.00 **[refundable]** plus £1 postage.

GAMES NEWS

TAKE ON THE TANKS

TANK RAID



The lives of your tank battalion are in your hands as they take on enemy forces.

Somewhere in the battlezone a bomb is set to go off. You must destroy it before time runs out.

Sixteen waves of enemy tanks roll before you, and you must defeat each one in turn. After you have defeated one wave you move on to the next and the location changes as if you are taking part in a live battle.

You must complete your mission within a set time limit. As you progress through the game more enemy tanks set upon you. Be careful to aim your missiles accurately because your firepower is limited. If you destroy a tank you receive bonus missiles to bolster your supply.

With 70 tanks for you to wipe out your task is not easy, especially as there is cover for them to hide behind and wait until you are in firing range.

To make your life more hazardous some tanks in the opposition force are indestructable, some are not. And you never know which is which.

Tank Raid runs on the Microtan 65 and if you fancy taking up the challenge of the tanks you can buy a copy from the Tangerine User Group for just under £10. Remember, it needs 16K memory to run.

HAUNTING EXPERIENCE

GHOST HUNT

Hunting ghosts along the corridors of a mansion on Huckleberry Hill is a daunting task.

They multiply without warning and suddenly appear from behind walls. Every few seconds they change roles and start off in frantic pursuit of your hunter.

In essence Ghost Hunter is a version of the arcade game Pacman. But this is the first version available for the Atari 400 and 800 personal computers. It has been specially imported from America by Manchester and London based Gemini Electronics.

The screen fills with a maze in the centre of which is a square forming the central meeting place of the ghosts. Covering the path of the maze is a line of dots which your hunter has to eat to earn points.

Four energy posts are in the corners of the maze, when you eat that in your trail hunt for the ghosts you automatically become the hunted instead of the hunter.

Altogether there are 51 variations of the game and it can be played by either one or two players, each moving a hunter about the maze gobbling up dots and ghosts.

With 16 different floor plans (maze patterns) there is plenty of scope to stop boredom creeping in. If you want to be surpised you can let the computer choose a floor plan for you.

A couple of special features have been written into the game to add excitement. By amassing points you get a bonus hunter to help you take on the ghosts. You'll need it because as the game progresses more and more ghosts haunt the maze.

The "Hide Instantly" facility speaks for itself. At the press of a button you can make your hunter disappear momentarily.

It's available now from Gemini on disc or cassette for 16K Atari computers. Cassette costs £16.95 and the disc version is £18.95, with an extra 50p for postage and packing.

HELP SAVE THE DWARF!

SIX KEYS OF TANGRIN

Here's two adventure games for Tangerine systems, both with oriental sounding names.

They are Tanlan Adventure and the Six Keys of Tangrin from the Tangerine User Group (TUG). Running on the Microtan 65 you will need a maximum of 16K memory space to get the games going.

The central figure in Tanlan Adventure isn't a Chinaman, but a dwarf. He has committed a crime so heinous that it is cloaked in secrecy. Only the authorities know the full details.



It is for that crime that he has been locked up in a jail which makes Colditz seem like on open prison.

You become his accomplice and your task is to get him out of jail. The game follows the traditional principles of adventure. You tell the computer what to do and where to go by keying in command instructions for direction and movement.

As you go you must pick up objects which could come in handy for the dwarf's escape, and avoid the police guards patrolling the jail.

The Six Keys of Tangrin is a different story. They are hidden throughout a series of deep caverns. By trial and error you must use your cunning and intuition to locate each of the keys.

It's not an easy job, as each one is inside a locked box. When you've found the box your next task is to open it. You win the game when you have managed to find all six keys.

The Six Keys is written in Basic and you only need a machine with an 8K-memory.

Tanlan Adventure needs 16K memory and is machine code written. Both can be bought from TUG, and both cost £5.95.



MAL FUNCTION
T. HITCH
SNAG JNR
SCREAMING FOUL UP
THE BUGS
ROOM!
'THE BUGS' COMPUTER PROGRAMMER IS PLAYING A WELL-KNOWN GAME OUTSIDE. BUT INSIDE ··· !!
YURK!
ULP!
PATENTED PROTON BUG PULVERISER!
ZLIP!
MEMORY BIN.
DON'T FIRE BINARY SNAKE REFUGEES
HISS!
KRUMPH!
SNARL!
MEMORY BIN 6B175 SCREAMING FOUL-UP DO NOT DISTURB!
CRUNCH!
GRAAAH!
OOOER!
SPACE INVADERS MAY BE PRETTY GOOD ··· BUT··
WHEN THEY MEET SCREAMING FOUL UP· ··NO CONTEST!
CRACK!
ULP!

ARCADE

KEEP ON DOCKING

TIPS * MOON CRESTA * TIPS

The whirling aliens of Moon Cresta have captivated many an arcade player and also produced some of the more colourful slang arcade expressions.

The game begins with a small craft at the bottom of the screen and the aliens swirling above it. These split up on being hit and the safest way to approach this first encounter is to blow up both halves of each alien before tackling the next one.

After two screens of these, the Super Flies appear — these move up the screen and to the right. These are best despatched by shooting from the middle of the screen, moving right and finally tackling the ones on the lefthand side.

After the second set of Super Flies, move into the centre of the screen ready for docking. Try not to use the thrust at all during docking as this wastes points.

If it becomes obvious that you will not dock successfully, use the thrust to move to the side, rather than salvage a bad docking. This way you don't earn a docking bonus but at least you won't lose a life. A successful docking results in more fire power.

The next life form (with the unlikely name, 4-D's) are quite unpredictable and must be dealt with as best you can. But make sure that after the second set your craft is on the righthand side so you don't get hit straight away by the Meteorites which follow them.

These come down in eight pairs and beginners make the mistake of shooting one and hiding from the other. The way to a good points score is to hit them both.

Finally and most dangerous are the Atomic Piles which get harder after each sequence.

The second time around two of these fall down in the lefthand side straight away. By the sixth time around the only safe spot is in the far righthand corner. Next time the only hope is to blast a hole for yourself.



STREET TALK

Among the descriptive expressions which Moon Cresta fans have formed for their game is Christmas Tree.

This is a slang term for all three stages docked on together to resemble a fir-tree.

A Double Disaster is the phrase to describe the fluffing your docking of the first and second stages.

The third stage is popularly known as Fat Val (especially in the Sheffield region!) because of its size and shape.

The meteorites are popularly known as "Fluffy Balls".

CROSSING THE BORDER

CUE BALL

The Video Pool which featured in our Arcade Action spot last month has several rivals out at the moment.

There are two ways of playing the game: by lining up the crosses on the balls (as described in Video Pool in the January issue) or by lining up the cross behind the ball on a cushion.

Cue Ball has such a method. In this game the player has just six balls to play with and runs the cross right or left along the cushion. When the cross is lined up behind the ball of your choice press the fire button and hope your eye is good enough.

If you do not fire within the time limit the cue ball will shoot off at whichever angle the cross is then at.

The balls do not have to be knocked down in sequence (1 to 6) but experienced players can improve their score by potting the balls in the hole with that number over it.

It is a game for people who can accurately judge an angle and takes a lot of getting used to.

If all six balls are downed another six are set up for the break. But take care to look at the angle the cue ball will rebound at, as it is important to keep that on the table.

The disadvantage of this game is that the cue ball always shoots off at the same velocity and a bad deflection could lose you the ball.

THE GAME NOW STANDING AT . . .

GUTTANG GOTTONG

Although the era when all children wanted to be engine drivers is behind us, railways still attract many enthusiasts.

And the spotters, model railway builders and steam railway buffs have been catered for by the arcade industry with a game called Guttang Gottong (I think it loses something in the translation from Japanese).

The screen is divided into a series of squares, each with some features of the railways, like: track crossovers, points, buffers or just plain lines. The edge of the screen is made up with stations — three on every side.

The aim of the game is survival, keep your train running and notch up points by going to the stations with a bonus score flashing up on them.

All this requires some careful track manoeuvring to achieve and the player has control of a black block which he moves around to change the layout of the tracks.

Bonuses can also be achieved by going over the four track crossovers but the danger here is that you have no control over which track your train will take and if a dead-end is lurking close by . . . !

The train's course is plotted by a change of colour and this helps in seeing where the next dead end lies in wait for your locomotive.

Other hazards are crazy trains which materialise if a player takes too long reaching a station showing a bonus. These travel around the track and hope to crash into your train. A good player will arrange the railway lines so that crazy trains crash into each other but this will create a no-go area on the lines.

The accelerate button will speed your train through a likely crisis point or to the next bonus station.

One way to seemingly avoid trouble is to make a loop which includes a couple of stations and wait for the bonus to crop up there. But this possibility had been foreseen by the game writers and a loop sweeper will appear on the line to prevent an overlong stay on a feature of this kind.

SHOWING A LONG LEG

SNAP JACK

Dangers abound in the imaginative game of Snap Jack which features a very mobile moon-buggy.

The craft in question moves backwards and forwards, fast or slow and also up and down on extendable legs at a push of the control lever.

The craft feeds on mysterious globules which hang in strings in the atmosphere which it reaches up to consume.

It has some of the elements of Pacman and Scramble in the game which sees the car running from all manner of weird dangers, using its expandable legs to good effect.

The main danger in this surreal world are the Medusa Jacks. These are airborne craft which swirl through the atmosphere and destroy the player's craft if they come in contact with it.

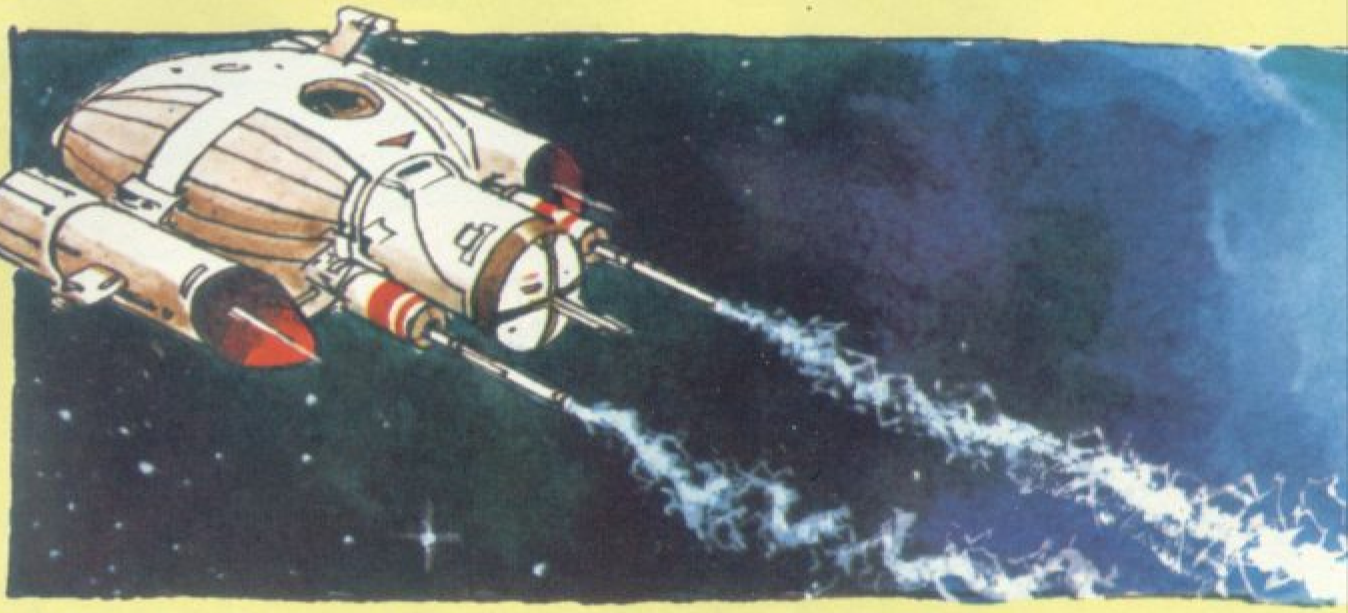
Other threats come in the form of cable cars which soar across the top of the screen and bouncing barrels, both of which cause instant death at a touch.

The player can turn the tables on the Medusa Jacks though, by eating a flashing dot which then enables him to chase after them and eat them up in the way of bonus points.

The difficulty of the game is increased by the extremely uneven terrain which the craft must travel over. And after a while the craft enters a subterranean cavern, where the cavern ceiling bulges just as dangerously as the floor. This makes things hard for the Medusa Jacks as well and the floor is soon littered with these creatures which have flown into the ceiling.

Large gaping fishes lie in wait for our intrepid craft here but it is after this section that the game really takes off, when a sleeping dragon lies in wait, ready to pursue the craft.

Marvellous graphics and the machine I played gave six lives, which was just as well — I needed all of them to reach the dragon.



IN THE CORRIDORS OF SPACE

TEMPEST

Tempest blows up a storm of ever-changing action for the arcade player.

There is no attempt to spin an Earth-saving theme around the game of Tempest — it relies on brightly coloured graphics, spectacular sound effects and a fast, frenetic affray with 28 skill level possibilities.

The player starts the game by selecting a "Hole" to play his first challenge on. Five possible Hole patterns are available.

These represent a three-dimensional display radiating out in channels from a starry background (see photograph of screen below).

From this centre the evil creatures radiate out towards the edge, along which the player moves. The player takes the form of a claw-like blaster which encompasses the end of whichever channel he has moved to.

From this vantage point he can rain down missiles to destroy the burgeoning life which is rushing upwards.

Among the "nasties" there are: Flippers, starlike creatures which run around the edge of the Hole upon reaching it; Fuseballs, zip up and down the corridors; Pulsars, lightning like monsters which appear at level 17. All of these also appear in "Tanker" form — which split into two of whichever creature on being hit. Spikers, leave deadly green spikes around the corridors, which can impale the player at the end of a Hole's life.

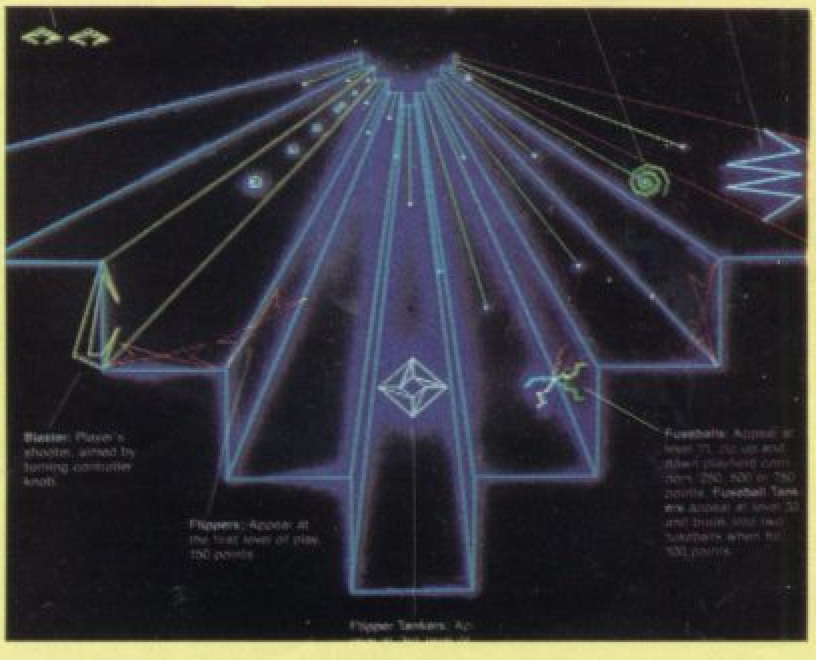
At the end of a "playfield" (as soon as all the creatures are killed) a new more difficult design appears on the screen with fiercer inhabitants.

The player's blaster is not helpless when a creature makes it to the edge as it can turn to fire along the edge as the monster approaches.

Among the many Hole designs are circles, heart-shapes, ovals, a selection of crosses and "V"s.

The player's controls include a knob which rotates his blaster, a fire button and a supper zapper, which can only be used twice. First time it eliminates all life, on the second occasion it kills off just one creature.

Three lives are available at the start but bonus blasters are earned for high scores.



THE NEXT STEP?

Atari's Tempest has got around the problem of making expert players run through the early stages of games which will be far too easy for them.

Once a player has reached one of the 28 skill level possibilities, he can start the game at the same level without going through the beginning levels again.

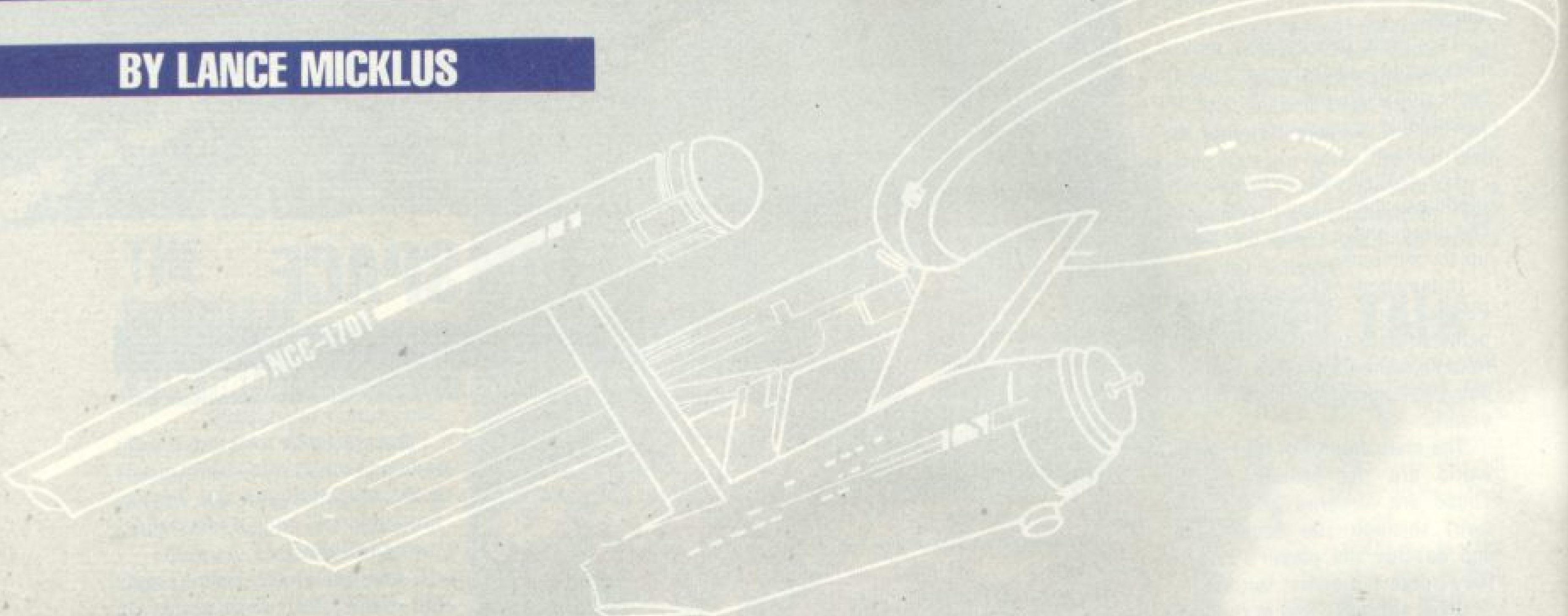
The company calls this feature Skill Step and rewards the good players who attempt a high level start with bigger scoring opportunities.

This feature may soon catch on across the arcade game scene.

STAR

RUNS ON A TANDY TRS-80 IN 24K

BY LANCE MICKLUS



Message from Star Fleet H.Q. Star Date 2000.

Orders for Captain James T. Kirk, Starship Enterprise.

1) Collect data on Sector Omega VI. Sector is divided into 192 quadrants for exploratory purposes (8x8x3 quadrants).

2) Preliminary reports indicate 5 Class M planets in the sector. Locate, orbit and gather data on each of them.

3) Intelligence reports 20 Klingon warships in sector. You are to locate and destroy them.

4) You are to complete your mission and report to Starbase in Quadrant 7,7,2 by Star Date 2500.

Star Fleet Command

6	7	8	
void	void	Unknown Quad	0
K1B0S1P1	void	Unknown Quad	1 5
void	void	Unknown Quad	2
void	void	Unknown Quad	0
K0B1S1P1	void	Unknown Quad	1 6
K0B0S1P1	K0B0S2P2	Unknown Quad	2
void	void	Unknown Quad	0
void	K0B1S2P1	Unknown Quad	1 7
void	Star Fleet HQ	Unknown Quad	2

LONG RANGE SENSOR SCAN QUADRANT 7 6 1
Hit (ENTER) to continue

The sample display, above, shows what a typical Long Range Sensor scan might look like. It was taken when the ship was located at quadrant 7,6,1 which is the quadrant in the middle of the display. There's a Klingon, one star and one planet in quadrant 6,5,1. Do you see the starbase in quadrant 6,6,1? If you do, good. That means you know how to interpret the Long Range Sensor Scan. The right-most column is all "Unknown Quadrant" because they are not in the galaxy. In other words, they don't exist.

TREK III·4

First, you must never forget the Prime Directive: You should not shoot at anything except Klingons, otherwise you will go to jail.

Also, you want to be careful manoeuvring your ship. If you collide with a star-base they will complain to Star Fleet Command. This will result in a loss of points, making it impossible to get a perfect score.

If you want to play to game to lose, try flying into a quadrant where there is a black hole or a class O star. The ship will be destroyed immediately and the game terminated. Another effective method is to ignore your crew and ship's reports, and just keep flying until you run out of energy.

The only honourable way to die is to be destroyed in a Klingon battle.

In this simulation of the Starship Enterprise, you will work with two computers — the ship's computer and the science computer. Their function, and that of the long range sensors, is of prime importance to the game.

To achieve your first objective, your ship's computer must have information about the number of Klingons, starbases, stars and planets in each quadrant of the galaxy. More detailed information is not necessary to achieve object number one, but may be helpful to you.

Each time you operate your long range sensors, the data displayed on the screen is also transferred and stored in the ship's computer.

The ship's computer can also provide you with information. It can scan its data bank to locate any area of the galaxy for which it does not have any basic data.

When Klingon vessels are encountered it's time to use the Phasors or the Photon torpedoes. Phasors aim themselves, but sometimes they miss. Also, Phasors use up energy from those big 4,000 gallon gas tanks.

The destructive power of the Phasors decreases with distance. On the other hand, Photon torpedoes destroy anything they hit, and they use no power; but you must aim them.

The Klingons shoot back. That's why you go to RED alert and get those deflector shields up. At least if they do hit you, the damage is minimized.

You will be notified of any damage to the ship by Damage Control. That is unless they are themselves damaged. If you want the full report, use the Damage Control command. You can also use a turn to speed repairs to the ship by using the Repair command.

After you've destroyed all of the Klingons, you will want to go back to condition GREEN. That way your deflector shields will be at a minimum power to save energy.

You might have noticed that there is an alert condition which is YELLOW. This is a standby battle ready condition that brings the shield power up part way to offer some protection from Klingon fire power, and yet still conserves energy. Why ever use condition YELLOW? Because quadrants near the Pulsar show up as noise on the LONG RANGE SENSOR scan.

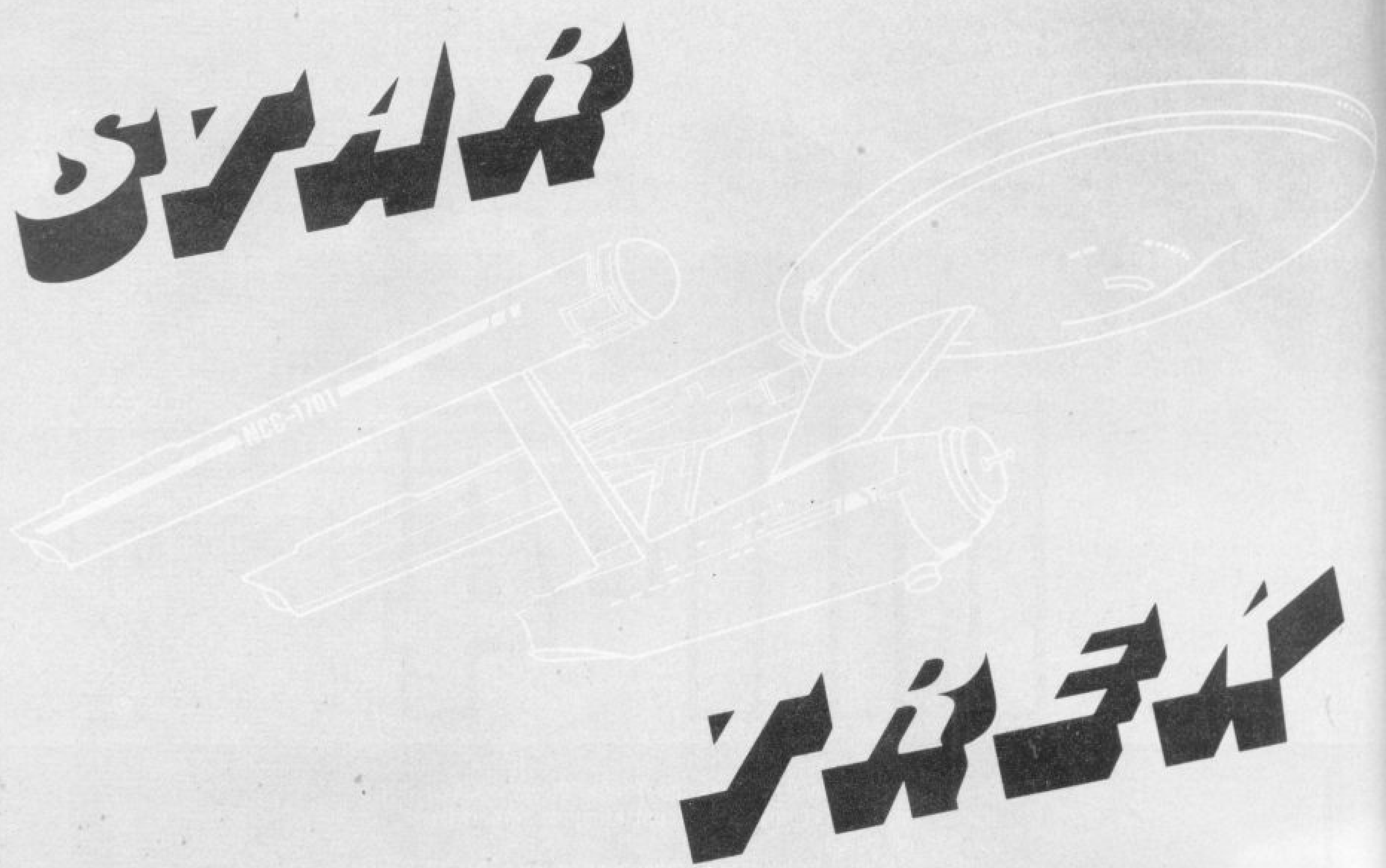
Whenever you are on YELLOW alert or RED alert, you get a status report automatically each turn.

The science computer is the counterpart of the long range sensors. It provides both you and the ship's computer with detailed information about the quadrant. This includes the classification of stars and planets, and the location and energy level of Klingons.

Since long range sensors only scan the immediate adjacent quadrants, you're going to have to move the ship. This is the function of the Warp Drive. This command lets you move from one quadrant to another, and automatically navigates around things like stars and black holes. You must provide the destination quadrant and the speed in warp units. The faster you go, the more energy you use. The slower you go, the more time (stardates) your trip will take.

You can think of the Enterprise as having a 4,000 gallon gas tank. By using the Status command, you can find out how much fuel

STAR TREK



you have left. You must keep your eye on this, lest you run out of fuel. To get more gas, or fuel, you must dock at a starbase.

To do this, you must first find a starbase by using your long range sensors, the ship's computer or a combination of both. But, don't try to dock at the starbase in quadrant 7,7,2 or you'll end the game — probably in disgrace. Use your Warp Drive to fly to the quadrant where the starbase is located.

Now you must manoeuvre the ship within the quadrant. This is the function of the Impulse Engines. You must supply the direction and speed. Use the compass below to give the direction. A unit of speed is approximately equal to one space. To dock, you must try to move the Enterprise into the same space that the starbase occupies. But don't try to move through it, or a collision will result. When that happens, other things will go wrong for you and a perfect score will no longer be possible.

After a successful docking, good things will happen. For one, you'll get a full fuel supply. Also, your stock of torpedoes will be set back to three, and most damage to the ship repaired.

But let's say you have plenty of fuel and your long range sensors turn up a quadrant with a planet: go to that quadrant using your warp drive. Now use the science computer to classify the planet(s). If it is an unexplored class M, then you will want to explore it. To do this, simply orbit the planet the same way you would dock to a starbase. Once orbit is achieved, the planet will be classified as an explored Class M planet and points scored. When you have orbited all five class M planets, objective number two will have been achieved.

You are now ready for objective number three, called "Kill the Klingons". First you've got to find them. If you've been doing much exploring, that won't be hard. They'll show up on the long range sensor scans. You must now get ready for battle.

First, you must put the deflector shields up to full power. Use the Alert Command and go to condition RED. Next, use the Warp Drive to enter the quadrant where the Klingons are.

A Pulsar is a giant static maker. The static is so strong near the Pulsar that the Long Range Sensors can not detect what is in the quadrant. Therefore, you must go to the quadrant using your Warp Drive to see if anything is there.

Don't be surprised if you suddenly find some Klingons. They know you can't see them from any distance, so, they like to lurk in the Pulsar noise, ready for a surprise attack.

Some players like to explore the noise quadrants in condition YELLOW to conserve energy and yet be ready for a surprise attack. Others prefer to explore these areas in condition RED.

One other thing you will find in the galaxy is a void. That's what the Long Range Sensors will display when they scan a quadrant which has nothing in it. Otherwise, it will display the number of Klingons (K), Starbases (B), Stars (S) and Planets (P).

Now I'm going to let you in on a little secret. If you should return to Basic, and want to continue, you can get back to the command level by typing GOTO 1 (ENTER). This is only to be used if, for some reason, the program should stop unexpectedly. It gives you a way to restart the game. Except for such an emergency, it should not be used.

Because it can take up to two hours to play an entire game, a save-game load-game feature has been added. When you are at the command level, type 1. The program will ask whether you are saving the current game, or loading a previously saved game. (Your cassette recorder should be ready prior to using this command.)

If you have only 16K of memory then in addition to omitting all REMarks, you will also want to delete the Disk I/O routines in Lines 40000-40400.

```
1 IFC1<>0THEN27
2 RANDOM:CLEAR100:DEFINTA,E,P,S,W,U,V,Z:DIMA(299):RESTORE:CLS
3 FORZ=0TO10:PRINT@RND(703),"*";:NEXT
4 PRINT@704,"STAR TREK(R) III, VERSION 3.4 - BY LANCE MICKLUS
5 PRINT"(R) TM PARAMOUNT PICTURES CORPORATION
6 PRINT"COPYRIGHT NOVEMBER 1979 - LANCE MICKLUS, INC.
7 PRINT"BURLINGTON, VT., 05401 - ALL RIGHTS RESERVED
8 U=25:V=14:I=5:GOSUB387
9 U=100:V=25:I=1:GOSUB387
10 U=80:V=12:I=4:GOSUB387
11 READB$,J:IFJ<>999THEN11
12 P=RND(191)-1:IFA(P)<>0THEN12
13 READJ:IFJ>0LETA(P)=-J:GOTO12
14 P=RND(150):M=P:IFA(P)<>0THEN14
```

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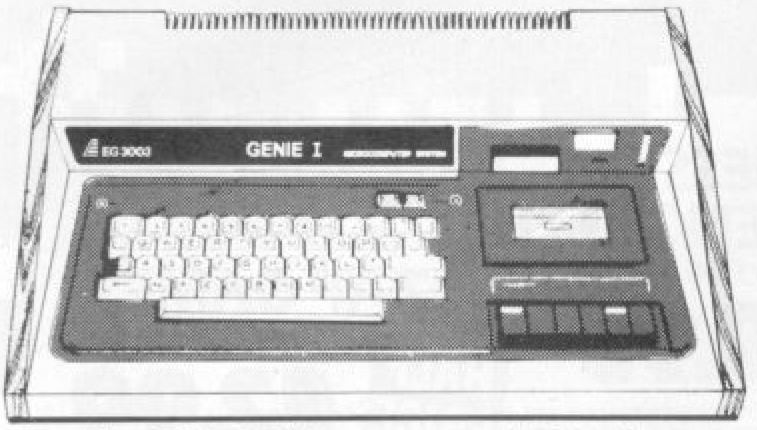
```
15 GOSUB328:GOSUB340
16 FORB=A(256)-1TOA(256)+1:FORC=A(257)-1TOA(257)+1
17 FORD=A(258)-1TOA(258)+1
18 GOSUB325
19 IFP<>-1LETA(P)=10*FIX(A(P)/10)-5
20 NEXTD:NEXTC:NEXTB:A(M)=-4
21 P=RND(191)-1:IFA(P)<>0THEN21
22 READA(P):IFA(P)<>0LETA(P)=-A(P):GOTO21
23 FORN=0TO190:IFA(N)=0THENA(N)=-1
24 NEXTN:A(256)=7:A(257)=7:A(258)=2:A(276)=3
25 E=3999:T=2200:H=2470:Q=0:A(191)=1006:S=0:C1=0.785398
26 A(259)=3:A(260)=3:A(261)=1:GOSUB191
27 ONERRORGOTO0:CLS:RESTORE:PRINTCHR$(23)
28 PRINT"ENTERPRISE AND CREW":PRINT"AWAITING YOUR ORDERS, CAPTAI
N.
29 READB$,J:PRINTTAB(5)J;:PRINTTAB(9)B$:IFJ<>11THEN29
30 O=99:INPUT"Orders";O
31 IFO<0THEN463
32 IFO>11ORINT(O)<>OTHEN27
33 IFO>4THEN35
34 ONO+1GOSUB314,91,77,248,278:GOTO36
35 ONO-4GOSUB410,282,176,232,225,64,104
36 GOSUB341:GOSUB325:IFABS(A(P))<10000THEN42
37 GOSUB208
38 IFA(261)=2LETA(261)=3:GOSUB69
39 IFA(268)=0ANDA(271)=0LETO=3:GOSUB80
40 IFA(271)=0GOSUB410
41 GOTO44
42 B$="SPACE STORM"
43 IFRND(100)=1GOSUB71:GOSUB111
44 IFA(261)>1GOSUB314
45 T=T+.2:E=E-A(261)*A(261)*10
46 IFE<0THEN437
47 J=1:GOSUB104
48 IFT<HTHEN27
49 CLS:PRINTCHR$(23):PRINT@384,"STAR FLEET COMMAND REQUESTS
50 PRINT"ENTERPRISE RETURN TO
51 PRINT"STARBASE 7,7,2":H=H+10:GOSUB335:GOTO27
52 GOTO27
53 CLS:RESTORE:N=2500-T:IFN<0THENS=S+N*10
54 FORP=0TO191:IFA(P)<0THEN56ELSES=S+1
55 IFA(P)-(FIX(A(P)/10)*10)=9LETS=S+20
56 NEXTP
57 READB$,Z:IFZ<>425THEN57
58 IFS<ZREADB$,Z:GOTO58
59 PRINT@256,"RATING:";INT(S/4.91)
60 PRINT:PRINT"ADMIRAL FITZPATRICK HERE...":PRINT
61 PRINTTAB(5)"CAPTAIN, AFTER REVIEWING YOUR LOG AND DATA TAPES,
62 PRINT"I AM GOING TO RECOMMEND TO STAR FLEET THAT YOU BE "B$".
63 PRINT:PRINT:END
64 CLS:PRINTCHR$(23)
65 PRINT@320,"1 - GREEN":PRINT"2 - YELLOW":PRINT"3 - RED
66 INPUT"Enter condition code";N
67 IFN<1ORN>3ORINT(N)<>NTHEN66
68 A(261)=N:IFN=1RETURN
69 RESTORE
70 READB$,J:IFJ-20<>A(261)THEN70
71 A$=INKEY$:CLS:PRINTCHR$(23)
72 B$=STRING$((30-LEN(B$))/2," ")+B$
73 FORK=0TO4:PRINT@512,B$:FORJ=0TO200:NEXTJ
74 PRINT@512,CHR$(30):FORJ=0TO200:NEXTJ
75 IFINKEY$<>CHR$(13)THENNEXTK:RETURN
76 FORK=0TO0:NEXTK:RETURN
77 CLS:IFA(268)<>0LETI=2:GOTO101
78 IFA(271)<>0LETI=5:GOTO101
79 O=0
80 FORP=192TO255:IFA(P)=18ORA(P)=0THEN89
81 IFO=3ANDA(P)<25THEN89
82 CLS:U=62:V=14
83 FORZ=0TORND(5)+2:PRINT@RND(512)+63,"*";:NEXTZ
84 GOSUB419:GOSUB386:GOSUB328
85 PRINT:PRINT"OBJECT AT";STR$(B);STR$(C);" IS A ";B$;".
86 IFA(P)<25THEN88
87 PRINT"READING";A(P)-25;"UNITS OF ENERGY.
88 GOSUB421
89 NEXTP
90 RETURN
91 CLS:RESTORE:READB$,Z
92 IFA(267)<>0LETI=1:GOTO101
93 PRINT"LT. UHURA HERE...
94 PRINT"DAMAGE CONTROL REPORTS THE FOLLOWING:
95 FORZ=267TO275:READB$,J:PRINTTAB(14)B$,
96 IFZ=275ANDA(276)=0PRINT"** INOPERATIVE **":GOTO100
97 IFA(Z)=0PRINT"OPERATIONAL":GOTO100
98 IFA(Z)<10PRINT"NEARLY OPERATIONAL
99 IFA(Z)>9PRINT"** INOPERATIVE **
100 NEXTZ:GOTO335
101 CLS:PRINTCHR$(23):RESTORE
102 READB$,J:IFI<>JTHEN102
103 PRINT@320,B$;" INOPERATIVE":GOTO421
104 FORN=1TOJ:FORZ=267TO275
105 IFA(Z)=0THEN110
106 A(Z)=A(Z)-RND(5):IFA(Z)>0THEN110
107 A(Z)=0:RESTORE:IFA(267)<>0THEN110
108 READB$,J:IFJ<>Z-266THEN108
109 CLS:PRINT@320,CHR$(23);B$;" OPERATIONAL":GOSUB421
110 NEXTZ:NEXTN:RETURN
111 FORJ=1TO4-A(261)
112 Z=266+RND(9):IFA(Z)<>0THEN117
113 A(Z)=RND(25)*J:IFA(267)<>0THEN117
114 CLS:PRINTCHR$(23):RESTORE
115 READB$,J:IFJ<>Z-266THEN115
116 PRINT@320,"DAMAGE TO ";B$:GOSUB421
117 NEXTJ:RETURN
118 CLS:P=X*8+Y+192:U=30:V=14
119 GOSUB386:GOSUB419:Z=338:M=I
120 PRINT:PRINTTAB(25)"sector:";X;Y
121 B$=" *":IFQ=1ANDI=5GOSUB166:GOTO125
122 B$="-":IFI=5THENGOSUB166:GOTO124
123 Z=336:B$=")":GOSUB166
124 B$=" ":GOSUB166
125 L=L*4
126 IFQ=1THEN130
127 IFRND(2)=1LETJ1=J1-X:K1=K1-Y:GOTO130
128 FORZ=1TOSQR(((X-J1)[2)+((Y-K1)[2)):L=L*.6:NEXTZ
129 X=J1:Y=K1:GOTO134
130 GOSUB426
131 X=X+J1:Y=Y+K1
132 IFX<0ORX>7ORY<0ORY>7LETP=-1:CLS:GOTO141
133 L=L*.6
134 P=INT(X)*8+INT(Y)+192
135 IFA(P)=0THEN131
136 IFQ=2RETURN
137 CLS:V=15:IFA(P)=18LETU=28
138 IFQ<>1ANDI=5ANDA(P)<25LETP=-1:GOTO142
139 IFQ<>1ANDI=1ANDA(P)<>18LETP=-1:GOTO142
140 GOSUB386
141 IFQ=2RETURN
142 GOSUB419:PRINT:PRINTTAB(25)"sector:";INT(X);INT(Y)
143 B$="* ":IFM=5ANDQ=1GOSUB170:GOTO147
144 B$="-":IFM=5GOSUB170:GOTO146
145 B$="(":GOSUB170
146 B$=" ":GOSUB170
147 Q=0:L=INT(L):IFP=-1ORI=0RETURN
148 GOSUB378
149 IFM=5ANDI<>1THENGOSUB159:GOSUB421:GOTO439
```

```
150 IFI<>5THEN155
151 GOSUB174:E=E-L
152 IFL-A(261)*75>0GOSUB111:L=L-A(261)*75:GOTO152
153 IFE>0RETURN
154 GOTO438
155 IFI<>1THEN159
156 A(P)=A(P)-L:IFA(P)>25RETURN
157 GOTO159
158 IFL<100RETURN
159 PRINTTAB(20)B$;" DESTROYED
160 FORN=0TO30
161 RESET(21+RND(17),12+RND(5)):SET(21+RND(17),12+RND(5))
162 NEXT
163 A(P)=0:GOSUB341:GOSUB325
164 A(P)=ABS(A(P))-10000:S=S+10
165 RETURN
166 FORN=ZTO380
167 PRINT@N,B$;:FORW=1TO3:NEXTW
168 NEXTN:IFQ=1PRINT@380," "
169 RETURN
170 FORN=380TO338STEP-1
171 PRINT@N,B$;:FORW=1TO3:NEXTW
172 NEXTN:IFQ=1PRINT@338," ";
173 PRINT@640,;:RETURN
174 FORW=1TOINT(L/50):PRINTCHR$(23);:FORN=1TO5:NEXTN
175 PRINTCHR$(28);:FORN=1TO5:NEXTN:NEXTW:GOTO173
176 CLS:IFA(273)<>0LETI=7:GOTO101
177 GOSUB341
178 PRINTCHR$(23):PRINT@320,"CHEKOV HERE...
179 INPUT"COURSE (X,Y,Z)";B,C,D:GOSUB325
180 IFP=-1THEN179
181 INPUT"WARP FACTOR (0-8)";K:IFK=0THENRETURN
182 IFK<0ORK>8ORINT(K)<>KTHEN181
183 L=SQR(((A(256)-B)[2)+((A(257)-C)[2)+((A(258)-D)[2))
184 IFE-100>L*K*K*KTHEN189
185 CLS:PRINT@320,CHR$(23);"Scott here...":PRINT
186 PRINT"SORRY CAPTAIN,":PRINT"BUT WE JUST DON'T HAVE
187 PRINT"ENOUGH ENERGY.
188 GOTO421
189 E=E-L*K*K*K:T=T+2*L/K:GOSUB340
190 J=INT(L*L/K):IFJ>0GOSUB104
191 GOSUB341:GOSUB325:GOSUB331
192 IFA(266)=0LETA(266)=8:A(P)=FIX(ABS(A(P))/10)*10+8
193 IFA(265)>0ANDA(266)=1LETA(266)=7:GOSUB329
194 B=X:C=Y:D=3:GOSUB326
195 IFA(266)>1ANDA(266)<5THEN430
196 IFA(266)>7LETA(265)=A(265)-1
197 FORN=192TO255:A(N)=0:NEXT:A(P)=18
198 FORN=262TO265
199 IFA(N)=0THEN205
200 IFN=262LETM=RND(1500)+250
201 IFN=263LETM=20
202 IFN=264LETM=19
203 IFN=265LETM=3
204 GOSUB404:A(N)=A(N)-1:GOTO199
205 NEXTN
206 IFA(266)>7LETM=2:GOSUB404
207 R=0:GOTO410
208 FORR=192TO255
209 IFA(R)<25THEN224
210 X=INT((R-192)/8):Y=R-192-(X*8):X1=X:Y1=Y
211 IFRND(2)>1THEN217
212 J1=SGN(A(259)-X):K1=SGN(A(260)-Y)
213 IFK%THENJ1=2-RND(3):K1=2-RND(3)ELSEJ1=J1*(RND(2)-1):K1=K1*(R
ND(2)-1)
214 IFX+J1>=0ANDX+J1<=7LETX1=X+J1
215 IFY+K1>=0ANDY+K1<=7LETY1=Y+K1
216 IFA(X1*8+Y1+192)=0LETZ=A(X*8+Y+192):A(X*8+Y+192)=0:X=X1:Y=Y1
:A(X*8+Y+192)=Z
217 IFK%THEN224
218 J1=A(259)-X:K1=A(260)-Y
219 X1=X:Y1=Y:J2=J1:K2=K1:Q=2:GOSUB130
220 IFP=-1THEN222
221 IFA(P)<>18THEN224
222 X=X1:Y=Y1:J1=A(259):K1=A(260):Q=0:L=RND(A(R)*.7)
223 IFL>100LETA(R)=A(R)-L:GOSUB118
224 NEXT:K%=0:RETURN
225 CLS:IFA(275)<>0ORA(276)=0LETI=9:GOTO101
226 Q=1:GOSUB410
227 INPUT"TORPEDO DIRECTION (0-8)";I:PRINTTAB(18)" ";
228 IFI<0ORI>8THEN227
229 K%=-1:GOSUB208
230 J1=COS(I*C1):K1=-SIN(I*C1):GOSUB341
231 A(276)=A(276)-1:Q=1:L=8000:GOTO118
232 CLS:IFA(274)<>0LETI=8:GOTO101
233 PRINTCHR$(23):PRINT@320,"SULU HERE...
234 INPUT"ENERGY";O:IFO<=0RETURN
235 PRINT"PHASERS LOCKED ON TARGET.
236 FORR=0TO250:NEXTR
237 FORR%=192TO255
238 IFA(R%)<25THEN247
239 K%=-1:GOSUB208
240 X=INT((R%-192)/8):Y=R%-192-X*8
241 J2=X:K2=Y
242 J1=X-A(259):K1=Y-A(260):GOSUB341
243 Q=2:GOSUB130:Q=0:J1=J2:K1=K2:L=O:GOSUB341
244 IFP=-1THEN246
245 IFA(P)<25THEN247
246 IFE-100-O>0LETE=E-O:GOSUB118
247 NEXTR%:RETURN
248 CLS:RESTORE:IFA(269)<>0LETI=3:GOTO101
249 READB$,J:IFJ<>50THEN249
250 PRINT"SHIP'S COMPUTER COMMAND FUNCTIONS:

251 PRINTTAB(4)J-50;" DATA BASE SCAN TO LOCATE ";B$
252 IFJ<>54READB$,J:GOTO251
253 PRINTTAB(5)"5  LONG RANGE SENSOR SCAN FROM DATA BASE
254 PRINTTAB(5)"6  QUADRANT DETAILED DISPLAY
255 PRINT:INPUT"Enter function";O
256 IFO<0ORO>6ORINT(O)<>OTHEN248
257 IFO<5THEN259
258 ONO-4GOTO275,270
259 CLS:RESTORE
260 READB$,J:IFJ-50<>OTHEN260
261 PRINT"ENTERPRISE CURRENTLY LOCATED AT:"A(256)A(257)A(258)
262 PRINT"DATA BASE SCAN FOR "B$":
263 FORP=0TO191
264 IFO=4ANDA(P)<0THEN268
265 IFA(P)<0ORO=4THEN269
266 GOSUB331
267 IFA(262+O)=0THEN269
268 GOSUB328:PRINTB;C;D,
269 NEXTP:PRINT:GOTO335
270 INPUT"Enter quadrant (X,Y,Z)";B,C,D:GOSUB325
271 IFP=-1THEN270
272 GOSUB331
273 IFA(P)<OPRINT"No data available.":GOTO421
274 GOTO342
275 INPUT"enter quadrant (X,Y,Z)";U,V,W:CLS
276 PRINT@904,"LONG RANGE COMPUTER QUADRANT SCAN of";U;V;W;
277 R=1:GOTO352
278 CLS:IFA(270)<>0LETI=4:GOTO101
279 U=A(256):V=A(257):W=A(258):R=0
280 PRINT@899,"LONG RANGE SENSOR SCAN";:PRINT@938,"Quadrant";U;V
;W;
281 GOTO352
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282 CLS:IFA(272)<>0LETI=6:GOTO101
283 Q=1:GOSUB410
284 INPUT"HEADING (0-8)";I:IFA(271)=0PRINTTAB(18)" ";
285 IFI<0ORI>8THEN284
286 J1=COS(I*C1):K1=-SIN(I*C1):GOSUB426
287 INPUT"SPEED (0-9)";J:IFA(271)=0PRINTTAB(18)" ";
288 IFJ<0ORJ>9THEN287
289 IFJ=0RETURN
290 GOSUB341:A(X*8+Y+192)=0
291 FORI=1TOJ:X=X+J1:Y=Y+K1
292 GOSUB424:GOSUB326
293 B$="ENERGY BARRIER
294 IFP=-1LETE=RND(E):GOTO302
295 IFB<>A(256)ORC<>A(257)THEN305
296 W=A(INT(X)*8+INT(Y)+192):B$="COLLISION
297 IFW<>20THEN301
298 IFJ-I>1LETS=S-100:GOTO302
299 IFA(A(256)*8+A(257)+A(258)*64)=1006THEN53
300 A(276)=3:E=4000:GOTO304
301 IFW=0THEN305
302 IFJ-I>1GOSUB71:GOSUB111:W=0:GOTO304
303 IFW<>2ANDW<>3ANDW<>19GOSUB71:GOSUB111
304 X=X-J1:Y=Y-K1:GOSUB424:GOTO306
305 NEXTI
306 X=INT(X):Y=INT(Y):A(X*8+Y+192)=18
307 IFB<>A(256)ORC<>A(257)GOSUB340:GOTO191
308 GOSUB340:Q=1:GOSUB410
309 IFW=2ORW=3ORW=19THEN312
310 IFE=4000PRINT"docked":PRINTTAB(18)" ";:GOSUB336:T=T+1:J=2:GO
TO104
311 GOTO336
312 IFW=2GOSUB341:GOSUB325:A(P)=FIX(ABS(A(P))/10)*10+9
313 PRINTTAB(16)"orbit":PRINTTAB(18)" ";:GOTO336
314 CLS:PRINTCHR$(23)
315 PRINT@266,"STATUS REPORT:":PRINTTAB(5)STRING$(14,"-")
316 PRINTTAB(5)"STARDATE:"T
317 PRINTTAB(5)"ENERGY:"E
318 B$="GREEN":IFA(261)=2LETB$="YELLOW
319 IFA(261)=3LETB$="RED
320 PRINTTAB(5)"CONDITION: "B$
321 PRINTTAB(5)"QUADRANT:"A(256)A(257)A(258)
322 PRINTTAB(5)"SECTOR:"A(259)A(260)
323 PRINTTAB(5)"PHOTON TORPEDOES:"A(276)
324 GOTO335
325 IFD<0ORD>2LETP=-1:RETURN
326 IFB<0ORB>7ORC<0ORC>7LETP=-1:RETURN
327 P=8*B+C+64*D:RETURN
328 D=INT(P/64):B=INT((P-D*64)/8):C=P-D*64-B*8:RETURN
329 A(P)=A(262)*1E4+A(263)*1E3+A(264)*1E2+A(265)*10+A(266)
330 RETURN
331 A(266)=ABS(A(P)):K=1E4
332 FORN=0TO3
333 A(262+N)=INT(A(266)/K):A(266)=A(266)-A(262+N)*K:K=K/10
334 NEXT:RETURN
335 PRINT
336 IFQ=1LETQ=0:RETURN
337 PRINT"Hit (ENTER) to continue.";
338 A$=INKEY$
339 IFINKEY$<>CHR$(13)THEN339ELSECLS:RETURN
340 A(256)=B:A(257)=C:A(258)=D:A(259)=X:A(260)=Y:RETURN
341 B=A(256):C=A(257):D=A(258):X=A(259):Y=A(260):RETURN
342 CLS:PRINT@384," ","coordinates:";B;C;D
343 PRINT" ","KLINGONS:"A(262),"STAR BASES:"A(263)
344 PRINT" ","STARS:"A(264),"PLANETS:"A(265)
345 RESTORE:IFA(266)>6ORA(266)<2LETB$="None":GOTO347
346 READB$,J:IFJ-30<>A(266)THEN346
347 PRINT" ","ASTRONOMICAL FEATURE: "B$:RESTORE
348 IFA(266)<7LETB$="none":GOTO350
349 READB$,J:IFJ-30<>A(266)THEN349
350 PRINT" ","SCIENTIFIC INTEREST: "B$:PRINT:PRINT
351 GOTO336
352 PRINT@64.
353 FORC=V-1TOV+1:FORD=W-1TOW+1:FORB=U-1TOU+1
354 GOSUB325
355 IFP=-1PRINT"  unknown quadrant ";:GOTO367
356 IFR=0ANDABS(A(P))-(INT(ABS(A(P))/10)*10)<>5THENA(P)=ABS(A(P)
)
357 IFR=1ANDA(P)<0PRINT"       no data       ";:GOTO367
358 IFR=1ANDA(P)=5THEN360
359 IFABS(A(P))<>1GOSUB331:GOTO361
360 PRINT"       void        ";:GOTO367
361 IFA(266)=2PRINT"  large black hole ";:GOTO367
362 IFA(266)=3PRINT"    class O star   ";:GOTO367
363 IFA(266)=4PRINT"       pulsar      ";:GOTO367
364 IFR=0ANDA(266)=5PRINT"    space noise    ";:GOTO367
365 IFA(266)=6PRINT"   Star Fleet HQ ";:GOTO367
366 PRINT"  K"A(262)"B"A(263)"S"A(264)"P"A(265)" ";
367 NEXTB:PRINT" ";D:NEXTD:PRINTCHR$(26);:NEXTC
368 PRINT@8,U-1;:PRINT@28,U;:PRINT@47,U+1;
369 PRINT@253,V-1;:PRINT@509,V;:PRINT@765,V+1;
370 PRINT@979,"";:I=191
371 FORZ=15360TO16192STEP64
372 IFZ=16192LETI=143
373 POKEZ,I:POKEZ+19,I:POKEZ+38,I:POKEZ+57,I
374 NEXTZ
375 FORZ=15425TO15487
376 IFPEEK(Z)=32POKEZ,140:POKEZ+256,140:POKEZ+512,140:POKEZ+768,
140
377 NEXTZ:GOTO336
378 I=0:B$="a tribble"
379 IFA(P)=2LETI=4:B$="class M planet"
380 IFA(P)=3LETI=4:B$="class G planet"
381 IFA(P)=18LETI=5:B$="star ship"
382 IFA(P)=19LETI=3:B$="class F star"
383 IFA(P)=20LETI=2:B$="star base"
384 IFA(P)>24LETI=1:B$="Klingon warship"
385 RETURN
386 GOSUB378
387 ONI+1GOTO388,401,399,395,392,389
388 RETURN
389 FORZ=U-7TOU-1:SET(Z,V-1):NEXTZ
390 FORZ=U-4TOU+5:SET(Z,V+1):NEXTZ
391 FORZ=U+1TOU+7:SET(Z,V):NEXTZ:SET(U-3,V):RETURN
392 FORZ=U-3TOU+3:SET(Z,V-1):SET(Z,V):SET(Z,V+1):NEXTZ
393 RESET(U-3,V-1):RESET(U+3,V-1):RESET(U-3,V+1):RESET(U+3,V+1)
394 RETURN
395 FORZ=U-2TOU+1:SET(Z,V):NEXTZ
396 FORZ=V-1TOV+1STEP2
397 SET(U-2,Z):SET(U+1,Z):SET(U-3,Z):SET(U+2,Z)
398 NEXTZ:RETURN
399 FORZ=U-5TOU+5:SET(Z,V+1):NEXTZ
400 SET(U,V):SET(U-2,V-1):SET(U-1,V-1):SET(U,V-1):RETURN
401 FORZ=U-5TOU+5:SET(Z,V):NEXTZ
402 SET(U-5,V-1):SET(U-4,V-1):SET(U+4,V-1):SET(U+5,V-1)
403 SET(U-1,V+1):SET(U,V+1):SET(U+1,V+1):RETURN
404 B=RND(8)-1:C=RND(8)-1:D=3
405 FORU=B-1TOB+1:FORV=C-1TOC+1
406 IFU<0ORU>7ORV<0ORV>7THEN408
407 P=B*U+V+192:IFA(P)<>0THEN404
408 NEXTV:NEXTU
409 GOSUB326:A(P)=M:RETURN
410 CLS:IFA(271)<>0LETI=5:GOTO101
411 A$=INKEY$:GOSUB341:GOSUB325:A(P)=ABS(A(P))
412 PRINT:FORC=0TO7:FORB=0TO7
413 P=B*8+C+192:PRINT"    -     ";
414 IFA(P)<>0LETU=B*16+7:V=3*C+4:GOSUB386
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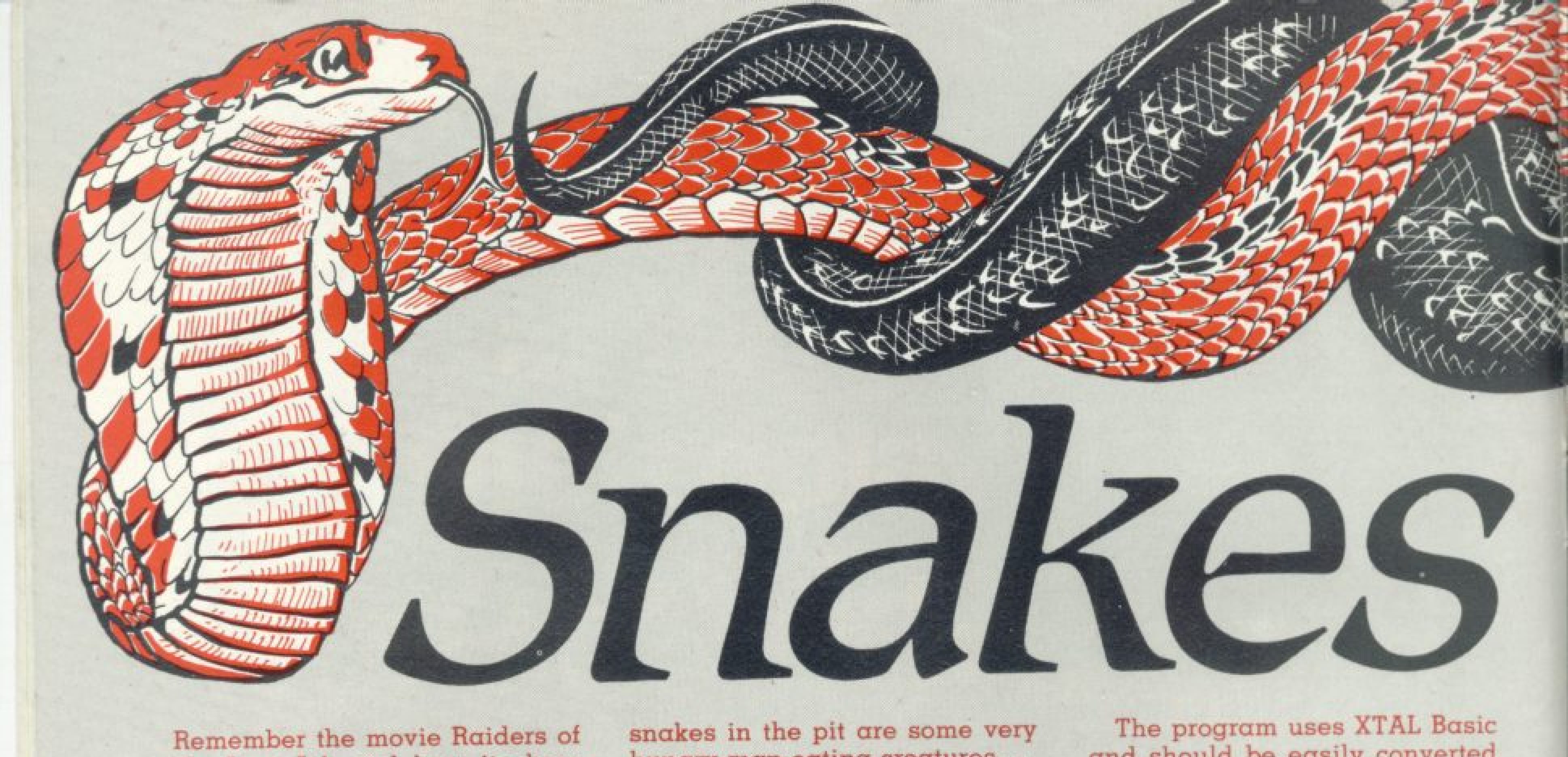
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415 NEXTB:IFINKEY$<>CHR$(13)THENNEXTC:GOSUB419ELSE418
416 PRINT@650,"SHORT RANGE SENSOR SCAN of quadrant";
417 PRINTA(256);A(257);A(258):PRINTTAB(18)" ";:GOTO336
418 CLS:PRINTTAB(18)"";:FORC=0TO0:NEXTC:RETURN
419 PRINT@0,STRING$(63,"=");:PRINT@576,STRING$(63,"=");
420 RETURN
421 A$=INKEY$:FORN=0TO700
422 IFINKEY$<>CHR$(13)THENNEXTN:RETURN
423 CLS:FORN=0TO0:NEXTN:RETURN
424 X=B*8+X:B=INT(X/8):X=X-B*8:Y=C*8+Y:C=INT(Y/8):Y=Y-C*8
425 RETURN
426 IFABS(J1)>ABS(K1)LETK1=K1/ABS(J1):J1=J1/ABS(J1):GOTO428
427 J1=J1/ABS(K1):K1=K1/ABS(K1)
428 J1=FIX(J1*1000+.5*SGN(J1))/1000
429 K1=FIX(K1*1000+.5*SGN(K1))/1000:RETURN
430 CLS
431 B$="LARGE BLACK HOLE":IFA(266)=3LETB$="CLASS O STAR"
432 IFA(266)=4B$="PULSAR"
433 B$="AFTER FLYING INTO A "+B$
434 PRINT@320,"ON STARDATE";STR$(T);", ";B$+","
435 PRINT"THE ENTERPRISE & CREW WERE LOST TO SPACE."
436 PRINT:PRINT:END
437 CLS:B$="AFTER DEPLETING ITS ENERGY SUPPLY":GOTO434
438 CLS:B$="WHILE DOING BATTLE AGAINST THE KLINGONS":GOTO434
439 CLS
440 PRINT@448,"Destruction of a ";B$;" is grounds for court-mart
ial."
441 PRINT:PRINT"You are relieved of your command."
442 PRINT:PRINT:END
443 DATA"STATUS",0,"DAMAGE CONTROL",1,"SCIENCE COMPUTER",2
444 DATA"SHIP'S COMPUTER",3,"LR SENSORS",4,"SR SENSORS",5
445 DATA"IMPULSE ENGINES",6,"WARP DRIVE",7,"PHASERS",8
446 DATA"PHOTON TORPEDOES",9,"ALERT",10,"REPAIR",11
447 DATA"KLINGON WARSHIPS",50,"STAR BASES",51
448 DATA"CLASS F STARS",52,"PLANETS",53
449 DATA"UNEXPLORED AREAS",54
450 DATA"GREEN",21,"YELLOW ALERT",22,"RED ALERT",23
451 DATA"black hole",32,"O star",33,"pulsar",34
452 DATA"space noise",35,"Star Fleet HQ",36,"G planet",37
453 DATA"unexplored M planet",38,"explored M planet",39
454 DATA"PROMOTED",425,"DECORATED",350,"REASSIGNED",290
455 DATA"DEMOTED",190,"RESIGNED",-1,"EXECUTED",-32000
456 DATA"E",999,30111,31111,30101,20121,20201,20001
457 DATA10001,10111,10211,10321,10221,-99
458 DATA1110,110,110,110,110
459 DATA1111,1111,1211,1121,1121
460 DATA3,3,2,2
461 DATA121,121,211,211,311,311,321,321,221,221
462 DATA121,121,211,211,311,311,321,321,221,221,0
463 CLS:IFPEEK(16396)=201THEN480ELSEPRINT@640,"";:LINEINPUT"Ente
r filespec -> ";A$
464 IFLEN(A$)=0THEN27
465 LINEINPUT"(L)oad or (S)ave a game? ";B$
466 IFLEN(B$)=0THEN27ELSEB$=LEFT$(B$,1)
467 IFB$<>"L"ANDB$<>"S"GOTO27
468 ONERRORGOTO479:IFB$="L"THEN474
469 OPEN"O",1,A$
470 PRINT#1,E;H;T;S
471 FORN=0TO279STEP10
472 PRINT#1,A(N);A(N+1);A(N+2);A(N+3);A(N+4);A(N+5);A(N+6);A(N+7
);A(N+8);A(N+9)
473 NEXTN:CLOSE:GOTO27
474 OPEN"I",1,A$
475 INPUT#1,E,H,T,S
476 FORN=0TO279STEP10
477 INPUT#1,A(N),A(N+1),A(N+2),A(N+3),A(N+4),A(N+5),A(N+6),A(N+7
),A(N+8),A(N+9)
478 NEXTN:CLOSE:GOTO27
479 CMD"E":CLOSE:GOSUB421:RESUME27
480 PRINT@639,
481 INPUT"(CL)OAD OR (CS)AVE A GAME ";B$
482 IFLEN(B$)<2THEN27ELSEB$=LEFT$(B$,2)
483 IFB$<>"CL"ANDB$<>"CS"THEN27
484 IFB$="CL"THEN491
485 PRINT"PREPARE RECORDER - THEN <ENTER>
486 IFINKEY$<>CHR$(13)THEN486
487 PRINT"SAVING GAME...":PRINT#-1,E,H,T,S
488 FORN=0TO279STEP30
489 PRINT#-1,A(N),A(N+1),A(N+2),A(N+3),A(N+4),A(N+5),A(N+6),A(N+
7),A(N+8),A(N+9),A(N+10),A(N+11),A(N+12),A(N+13),A(N+14),A(N+15)
,A(N+16),A(N+17),A(N+18),A(N+19),A(N+20),A(N+21),A(N+22),A(N+23)
,A(N+24),A(N+25),A(N+26),A(N+27),A(N+28),A(N+29)
490 NEXT:GOTO27
491 PRINT"PREPARE CASSETTE...":INPUT#-1,E,H,T,S
492 FORN=0TO279STEP30
493 INPUT#-1,A(N),A(N+1),A(N+2),A(N+3),A(N+4),A(N+5),A(N+6),A(N+
7),A(N+8),A(N+9),A(N+10),A(N+11),A(N+12),A(N+13),A(N+14),A(N+15)
,A(N+16),A(N+17),A(N+18),A(N+19),A(N+20),A(N+21),A(N+22),A(N+23)
,A(N+24),A(N+25),A(N+26),A(N+27),A(N+28),A(N+29)
494 NEXT:GOTO27
```

STAR TREK



Snakes

Remember the movie Raiders of the Lost Ark and how its hero Indiana Jones just hated snakes? Well, he would hate this game too — and it would take all his swashbuckling ingenuity to get out of The Arena. How will you fare?

Players find themselves in an arena full of snakes. The sides of the pit are electrified — just to add to the difficulty. Among the snakes in the pit are some very hungry man-eating creatures . . .

All you have to do is get out of the Arena by the exit, dodging any snake which takes a fancy to you. Sounds easy. But in order to score points you must hit energy banks dotted around the Arena on your way out — and once you reach the exit there's another arena full of snakes waiting for you.

The program uses XTAL Basic and should be easily converted to any other Basic. If you do not have to PRINT facility then you can use POKE (SPAX + 40*Y) or lots of cursor movements. The machine code routine can be replaced with GET, INCH, KBD, or whatever your system uses, it simply returns the ASCII value of your key even when you keep it depressed.

ARENA RUNS SHARP MZ-8
BY CHRIS DAV



```
0 CLEAR
1 DEF FN POK(Z)=PEEK(53248+X+40*Y)
2 DEF FN SPO(Z)=PEEK(53248+SX(C)+40*SY(C))
3 NS=9:M=3:RESTORE
4 GOSUB 5000:SC=0
5 M$=CHR$(99)+CHR$(99)+CHR$(99)
6 REM *** SET UP KBD SCAN ROUTINE
7 FOR T=24553 TO 24560:READ A:POKE T,A:NEXT T
8 DATA 205,27,0,50,240,95,201,0
10 REM ***PRINT SCREEN***
20 CLS:PK=0
21 POKE 4513,1
30 FOR C=3 TO 70
31 POKE 4514,C-2:CALL 68
40 X=INT(1+37*RND(C))
50 Y=INT(2+22*RND(X))
60 IF FN POK(C)<>0 THEN 40
70 PRINT@X,Y,"▓":
71 PRINT@0,C/3,"▒";@38,C/3,"▒";
80 NEXT C
90 PRINT@0,1,"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒ ";
100 PRINT@0,24,"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒████████";
101 CALL 71
110 X=INT(2+10*RND(VAL(TI$)))
120 Y=INT(2+19*RND(VAL(TI$)))
130 IF FN POK(Z)<>0 THEN 110
140 PRINT@X,Y,CHR$(99):
150 PRINT@38,INT(5+15*RND(X)),"▓▓ ▓▓";
160 FOR C=1 TO NS
170 SX(C)=INT(13+24*RND(VAL(TI$)))
180 SY(C)=INT(2+19*RND(VAL(TI$)))
190 IF FN SPO(Z)<>0 THEN 170
200 PRINT@SX(C),SY(C),CHR$(105)
210 NEXT C:C=0
215 PRINT@0,0,M$:
220 REM ***START OF GAME*** :PK=0
225 PRINT@M,0,"    ","Score:";SC,"Snakes:";NS:
230 C=C+1:IF C>NS THEN C=1
235 PRINT@SX(C),SY(C)," ";
240 SX(C)=SX(C)-SGN(SX(C)-X)
250 SY(C)=SY(C)-SGN(SY(C)-Y)
255 IF FN SPO(Z)=202 THEN 1000
260 IF FN SPO(Z)<>0 THEN 240
270 PRINT@SX(C),SY(C),CHR$(105);
280 REM ***MOVE MAN***
290 CALL 24553
300 K=PEEK(24560)
```





Alive



S ON A
-80K
AVISON

```
305 PRINT@X,Y," ";
310 IF K=87 THEN Y=Y-1
320 IF K=88 THEN Y=Y+1
330 IF K=65 THEN X=X-1
340 IF K=68 THEN X=X+1
350 IF FN POK(Z)=67 THEN SC=SC+10
360 IF FN POK(Z)>205 THEN 1000
370 PRINT@X,Y,CHR$(99):
380 IF X>38 THEN 3000
400 GOTO 220
999 REM *** VOLT'S ROUTINE
1000 POKE 4513,0
1010 FOR C=10 TO 50
1020 POKE 4514,C
1030 CALL 68
1040 PRINT@X,Y,CHR$(99)+"■■■ ";
1050 NEXT
1060 PRINT@X,Y,"※";:CALL 71
1070 M=M-1:IF M<0 THEN 4000
1075 X=INT(2+10*RND(VAL(TI$)))
1076 Y=INT(2+21*RND(VAL(TI$)))
1077 IF FN POK(Z)<>0 THEN 1075
1078 PK=0:MUSIC "A0BCDCDCBABABACBDEF"
1080 GOTO 220
3000 NS=NS-1:IF NS<1 THEN SC=SC*2:NS=5
3010 GOTO 10
3999 REM ***END OF GAME ROUTINE
4000 MUSIC "A0DADADADAEBEBEBEADADABC"
4010 CLS
4020 PRINT,"YOUR SCORE....";SC
4030 R=INT(1+10*RND(VAL(TI$)))*10 :SC=SC+(11-NS)*R
4040 PRINT,"■■■";(11-NS);"X";R
4045 PRINT@15,10,"+ BONUS OF....";
4046 PRINT (11-NS)*R;"..."
4049 FOR C=1 TO 40
4050 PRINT@16,15,SC;"■■■■■          "
4055 FOR G=1 TO 10:NEXT
4060 NEXT
4070 PRINT@9,15,"*******";SC;"*******"
4080 IF SC>HS THEN HS=SC
4090 PRINT "■■■■DO YOU WANT ANOTHER GAME ?";:A=INCH
4100 IF A=89THEN 3
4110 CLS
4120 END
5000 CLS
5010 PRINT "        MAN-MAZE"
5020 PRINT "        ────────"
5030 PRINT " You are in an arena,however so are"
5040 PRINT "some very hungry snakes."
5050 PRINT "While they are chasing you,you can "
5060 PRINT "score points by hitting the ▦'s !"
5070 PRINT "There is an exit on one side and you may leave at any time"
5080 PRINT " Oh the fence has 15 MEGA VOLTS going   through it so don't touch!"
5090 PRINT "■■■■YOUR CONTROLS...."
5100 PRINT "      W"
5110 PRINT "      ↑"
5120 PRINT "    A←";CHR$(99);"→D"
5130 PRINT "      ↓"
5140 PRINT "      X     Release to stop"
5150 PRINT "■HI-SCORE.... ";HS;"!!!"
5160 PRINT "■**BONUS FOR FINISHING ALL ROUNDS**"
5161 TEMPO 6
5165 MUSIC "0GFGFRGFGEGEFREEFFCFCGGEDCC"
5170 PRINT "■hit any key to start";
5180 A=INCH:RETURN
```





BY RICHARD JOHNSON



DODGER

RUNS ON AN APPLE

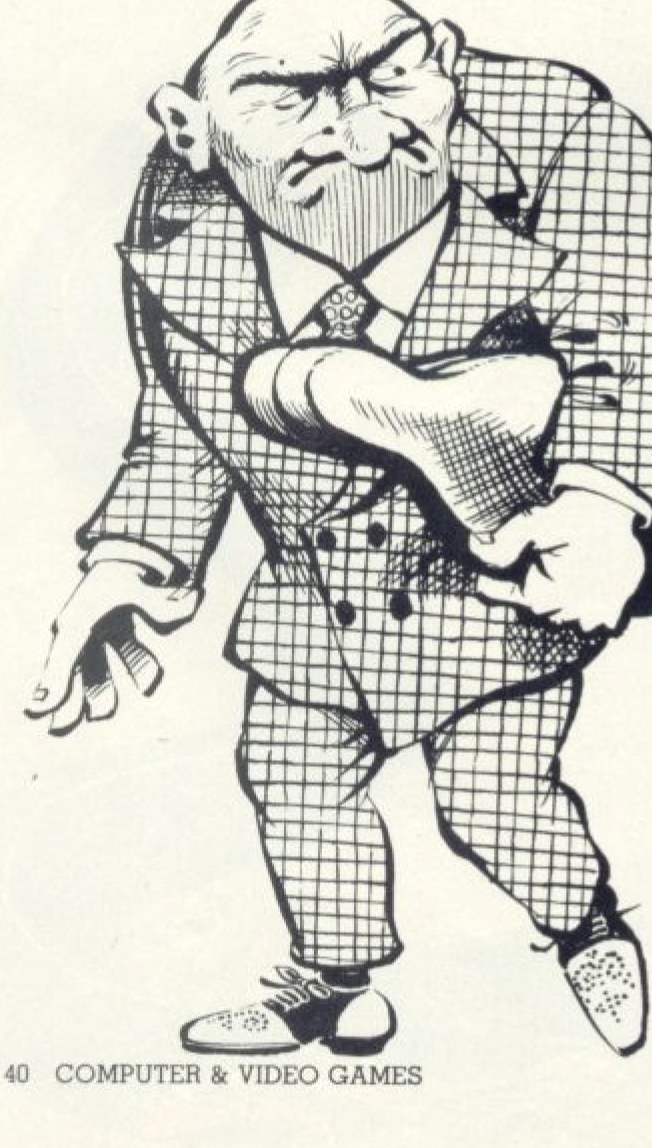
Watch out there's a gangster about! and a contract has been put out on you.

Dodger is a neat graphics and sound game which features a crowd of Chicago hoodlums armed with nothing more deadly than empty violin cases.

But they are out to get you. There's a fence around the screen and a small hole at the top through which you have to escape. There are 1 to 50 bad guys, you choose how many. The object is simply to get out of the exit before one of the bad guys catches you.

You are able to shoot some of the gangsters — but how many bullets you get depends upon the number of bad guys you've chosen.

It's simple but very addictive and trying to escape from all 50 villains is a real challenge.



```
100 REM  ‡ DODGER ‡
110 REM  COPYRIGHT R.H. JOHNSON
120 DIM A$(10),X(50),Y(50)
130 RULES=0
140 REM  ‡ THE GAME OF DODGER ‡
150 REM  ‡ DICK JOHNSON 2/17/80 ‡
160 GOSUB 1650
170 GOSUB 440: REM  GET READY
180 CALL -936: TAB 3: PRINT "YOUR MO
    VE? (L,R,U,D,S) ";"   (BULLETS "
    ;BULLET;")  "
190 FOR M=1 TO 10:SOUND= PEEK (
    -16336)- PEEK (-16336): NEXT
    M
200 A= PEEK (-16384): IF A<127 THEN
    200
210 POKE -16368,0
220 IF A= ASC("L") THEN A$="L":
    IF A= ASC("R") THEN A$="R"
    : IF A= ASC("U") THEN A$="U"
    : IF A= ASC("D") THEN A$="D"

230 IF A= ASC("S") THEN A$="S":
    IF A=141 THEN A$=""
240 GOSUB 840: REM  MY MOVE
250 MOVE=MOVE+1
260 IF DEAD=BAD THEN GOTO 1390
270 FOR I=1 TO BAD: REM  MOVE THEM
280 IF X(I)=-1 AND Y(I)=-1 THEN
    410
290 XG=XX:YG=YY: IF ( ABS (YY-1
    ))>15 THEN 320: IF ABS (X(I)
    -XX)+ ABS (Y(I)-YY)<5 THEN
    320
300 IF I>2 THEN 310:XG=20:YG=1:
    GOTO 320
310 IF (I MOD 5)#0 THEN 320:XG=
    (XX+20)/2:YG=(YY+1)/2
320 DX=0: IF X(I)>XG THEN DX=-1
    : IF X(I)<XG THEN DX=1:DY=0
```

```
: IF Y(I)>YG THEN DY=-1: IF
   Y(I)<YG THEN DY=1
330 IF I<3 AND Y(I)>10 THEN DY=
   -1
340 XNEW=X(I)+DX:YNEW=Y(I)+DY: IF
   SCRN(XNEW,YNEW)=ME THEN KILL=
   1
350 IF SCRN(XNEW,YNEW)=THEM OR
   SCRN(XNEW,YNEW)=EDGE THEN 410
360 IF SCRN(XNEW,YNEW)#BOMB THEN
   380
370 GOSUB 2000: GOTO 410: REM  HIT A
   BOMB
380 SOUND= PEEK (-16336)+ PEEK
   (-16336)
390 COLOR=0: PLOT X(I),Y(I)
400 X(I)=XNEW:Y(I)=YNEW: COLOR=
   THEM: PLOT XNEW,YNEW
410 IF KILL=1 THEN 1530: NEXT I
420 GOTO 180
430 TEXT : END
440 REM  GET READY TO PLAY
```

```
560 SHELL=11
570 BOMB=4
580 COLOR=EDGE
590 REM  DRAW OUTSIDE
600 HLIN 0,39 AT 0
610 HLIN 0,39 AT 39
620 VLIN 0,39 AT 0
630 VLIN 0,39 AT 39
640 COLOR=0: REM  DRAW GOAL
650 HLIN 19,21 AT 0
660 TAB 5: INPUT "HOW MANY BAD GUYS?
   (1-50) ",BAD
670 IF BAD=0 THEN 2090
680 IF BAD<1 OR BAD>50 THEN 660
690 BULLET=BAD/3
700 IF BULLET<1 THEN BULLET=1
710 GOSUB 1920: REM   CHECK FOR BOMB
   S
720 REM  PLACE BAD GUYS
730 FOR I=1 TO BAD
740 X(I)=1+ RND (38)
750 Y(I)=1+ RND (38)
760 COLOR=THEM: PLOT X(I),Y(I)
```

```
920 IF A$#"R" THEN 940
930 DX=1:DY=0: GOTO 970
940 IF A$#"U" THEN 960
950 DX=0:DY=-1: GOTO 970
960 DX=0:DY=1: GOTO 970
970 DX=2*DX:DY=2*DY
980 XNEW=XX+DX:YNEW=YY+DY
990 IF XNEW>-1 AND XNEW<40 AND
   YNEW>-1 AND YNEW<40 THEN 1010
1000 IF XNEW<0 THEN XNEW=0: IF XNEW>
   39 THEN XNEW=39: IF YNEW<0 THEN
   YNEW=0: IF YNEW>39 THEN YNEW=
   39
1010 IF SCRN(XNEW,YNEW)=0 AND ( ABS
   (DX)+ ABS (DY))=1 THEN 1040
1020 IF SCRN(XNEW,YNEW)=0 AND SCRN(
   (XX+XNEW)/2,(YY+YNEW)/2)=0 THEN
   1040
1030 DX=DX/2:DY=DY/2: IF DX=0 AND
   DY=0 THEN 880: GOTO 980
```



```
450 POKE -16300,0: REM  PAGE 1
460 POKE -16298,0: REM  LO RES
470 GR : CALL -936: REM  CLEAN SLATE
480 MUSIC=2:PITCH=0:TIME=1
481 POKE 2,173: POKE 3,48: POKE
   4,192: POKE 5,136: POKE 6,208
   : POKE 7,4: POKE 8,198: POKE
   9,1: POKE 10,240
482 POKE 11,8: POKE 12,202: POKE
   13,208: POKE 14,246: POKE 15
   ,166: POKE 16,0: POKE 17,76
   : POKE 18,2: POKE 19,0: POKE
   20,96
500 KILL=0
510 DEAD=0
520 MOVE=0
530 ME=15
540 THEM=1
550 EDGE=13
```

```
770 NEXT I
780 REM  PLACE US
790 COLOR=ME
800 XX=1+ RND (38):YY=30+ RND (
   9)
810 IF SCRN(XX,YY)<>0 THEN 800
820 PLOT XX,YY
830 RETURN
840 REM  MAKE MY MOVE
850 IF LEN(A$)=0 THEN RETURN
860 IF A$="S" THEN 1090
870 IF A$="L" OR A$="R" OR A$="U"
   OR A$="D" THEN 900
880 PRINT "": REM CTRL-G
890 POP : GOTO 180
900 IF A$#"L" THEN 920
910 DX=-1:DY=0: GOTO 970
```

```
1040 COLOR=0: PLOT XX,YY
1050 XX=XNEW:YY=YNEW
1060 COLOR=ME: PLOT XX,YY
1070 IF YY=0 THEN GOTO 1390: REM  WIN
   !
1080 RETURN
1090 REM  TAKE A SHOT
1100 IF BULLET=0 THEN RETURN
1110 CALL -936: TAB 5:SOUND= PEEK
   (-16336)+ PEEK (-16336): PRINT
   "WHICH WAY? (L,R,U,D)"
1120 A= PEEK (-16384): IF A<127 THEN
   1120
1130 POKE -16368,0
1140 IF A= ASC("L") THEN A$="L":
   IF A= ASC("R") THEN A$="R"
```

We just want to be part of the furniture

Everyone's talking about home computers but few have seen them yet. The new Atari 800 & 400 computers and Commodores Vic 20 are now on show at Microchips.

Now at a price within everyone's reach, a personal computer plugged into your television set will not only provide entertainment for the whole family but will also prove to be an invaluable business and educational tool.

Both systems have sound and colour graphics, are expandable and easily programmed in your own home.



The personal computer will soon be part of the furniture in every home. Be ahead of the queue and contact Microchips for further details now. We will be delighted to demonstrate these exciting and invaluable additions to your home.

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SOS Missile Command... Multihead Destructors destroyed city... SOS Missile Command... Cluster Mines sighted... SOS Missile Command... Plasma Projectile assault... SOS Missile Command... Satellite Bombs in range... SOS Missile Command... Megon Annihilator destroyed further city... SOS

Kansas £350
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YOU command the ground-to-air missiles to save the cities from total Alien destruction, progressing to TEN levels of difficulty from not-to-easy to bloody impossible! Multiple displays with five types of Aliens and Satellite Bomber. Each type of Alien attacks on a different trajectory, even splitting and changing course without warning.

Based on the Arcade game of the same name, this is easily the finest computer game of its kind available today. It demands quick responses and no small amount of skill to overcome the Aliens even at the lower levels of play. As the game proceeds, so does the risk of total ahiliation, giving at last, a very, very competitive game indeed, and one which will satisfy even the very skilled gamesman.

Very spectacular explosions and sound effects complete the realism. Infinite missile-'sight' control giving movement in every direction.



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```
    : IF A= ASC("U") THEN A$="U"
    : IF A= ASC("D") THEN A$="D"

1150 IF A$#"L" AND A$#"R" AND A$
     #"U" AND A$#"D" THEN 1110
1160 IF A$#"L" THEN 1180
1170 DX=-1:DY=0: GOTO 1230
1180 IF A$#"R" THEN 1200
1190 DX=1:DY=0: GOTO 1230
1200 IF A$#"U" THEN 1220
1210 DX=0:DY=-1: GOTO 1230
1220 DX=0:DY=1
1230 XS=XX:YS=YY
1240 BULLET=BULLET-1
1250 XNEW=XS+DX:YNEW=YS+DY
1260 IF XNEW>0 AND XNEW<39 AND YNEW>
     0 AND YNEW<39 THEN 1280
1270 IF XS=XX AND YS=YY THEN RETURN
     : COLOR=0: PLOT XS,YS: RETURN

1280 IF SCRN(XNEW,YNEW)=0 THEN 1360

1290 FOR T=1 TO 6: COLOR= RND (15
     ): PLOT XNEW,YNEW:SOUND= PEEK
     (-16366)+ PEEK (-16366): NEXT
     T
1310 COLOR=0: PLOT XNEW,YNEW
1320 POKE TIME,6: POKE PITCH,50:
     CALL MUSIC
1330 FOR M=1 TO BAD: IF X(M)=XNEW AND
     Y(M)=YNEW THEN 1350: NEXT M
1340 GOTO 1270
1350 X(M)=-1:Y(M)=-1:DEAD=DEAD+1
     : GOTO 1270
1360 IF XS=XX AND YS=YY THEN 1370
     : COLOR=0: PLOT XS,YS: COLOR=
     SHELL: PLOT XNEW,YNEW
1370 XS=XNEW:YS=YNEW
1380 GOTO 1250
1390 REM  YOU WIN!
1400 POKE TIME,4: POKE PITCH,200
     : CALL MUSIC
1410 POKE TIME,6: POKE PITCH,50:
     CALL MUSIC
1440 CALL -936
1450 TAB 10: PRINT "YOU WON! IN "
     ;MOVE;" MOVES"
1460 POKE TIME,10: POKE PITCH,150
     : CALL MUSIC
1470 FOR REP=1 TO 25
1480 POKE TIME,4: POKE PITCH,75:
     CALL MUSIC
1490 NEXT REP
1500 FOR I=1 TO 1000: NEXT I
1510 TEXT : CALL -936
1520 GOTO 140
1530 REM  THEY GOT YOU!
1540 FOR M=1 TO 15
1550 POKE TIME,3: POKE PITCH,250
```



```
     : CALL MUSIC
1570 COLOR= RND (15)+1: PLOT XX,
     YY
1580 CALL -936: TAB (M): PRINT "THEY
     GOT YOU IN ";MOVE;" MOVES"
1590 FOR T=1 TO 50: NEXT T
1600 NEXT M
1610 FOR M=0 TO 39: COLOR=EDGE
1620 HLIN 0,39 AT M: NEXT M
1630 FOR M=1 TO 200: NEXT M: PRINT
     "": REM CTRL-G
1640 GOTO 140
1650 REM  * TITLE *
1660 TEXT : CALL -936
1670 VTAB 10: TAB 15
1680 PRINT "D O D G E R"
1690 FOR I=1 TO 1000: NEXT I
1700 GOSUB 1730
1710 RULES=1
1720 PRINT "": RETURN : REM CTRL-G
1730 REM  INSTRUCTIONS
1740 TEXT : CALL -936
1750 IF RULES>0 THEN RETURN
1760 VTAB 10: TAB 15: INPUT "RULES? (
```

DODGER

WATCH OUT! THERE'S A GANGSTER ABOUT

```
     Y/N) ",A$
1770 IF A$="N" THEN RETURN
1780 CALL -936
1790 RULES=1
1800 VTAB 5: TAB 15: PRINT "R U L E S
     "
1810 PRINT
1820 TAB 5: PRINT "YOU WANT TO GET TO
      THE HOLE AT TOP."
1830 TAB 5: PRINT "THE BAD GUYS WILL
      TRY AND"
1840 TAB 5: PRINT "CHASE YOU AND EAT
      YOU."
1850 TAB 5: PRINT "EACH TURN YOU CAN
      MOVE UP,"
1860 TAB 5: PRINT "DOWN,LEFT,RIGHT OR
      SHOOT"
1870 TAB 5: PRINT "ONE OF YOUR BULLET
     S."
1880 TAB 5: PRINT
1890 TAB 5: PRINT "IF A BAD GUY HITS
     A BOMB HE DIES.": PRINT
1900 FOR M=1 TO 5000: NEXT M
1910 RETURN
1920 REM  PLACE BOMBS
1930 BNUM=BAD/5
1940 IF BNUM=0 THEN BNUM=1
1950 COLOR=BOMB
1960 FOR TT=1 TO BNUM
1970 PLOT 1+ RND (38),1+ RND (38
     )
1980 NEXT TT
1990 RETURN
2000 REM  HIT A BOMB
2010 COLOR=0: PLOT X(I),Y(I)
2020 X(I)=-1:Y(I)=-1:DEAD=DEAD+1

2030 FOR TT=15 TO 0 STEP -1
2040 COLOR=TT
2050 PLOT XNEW,YNEW
2060 FOR SSS=1 TO 5:SOUND= PEEK
     (-16336)- PEEK (-16336): NEXT
     SSS
2070 NEXT TT
2080 RETURN
2090 TEXT : REM  TIME TO QUIT
2100 END
```

AIR ATTACK

BY CHRISTOPHER EDE

Enemy planes on the starboard bow Captain. The odds are overwhelming as the fleet of bombers is inexhaustible and your warship has few chances to fire back.

As bombs crash into the ocean, you fire back with a rocket launcher at the back of the boat. It fires diagonally and cannot be moved up or down. If the planes dodge this fire you can open up with your ack-ack guns.

But with only 12 rockets to fire it is important you are accurate and choose your targets carefully.

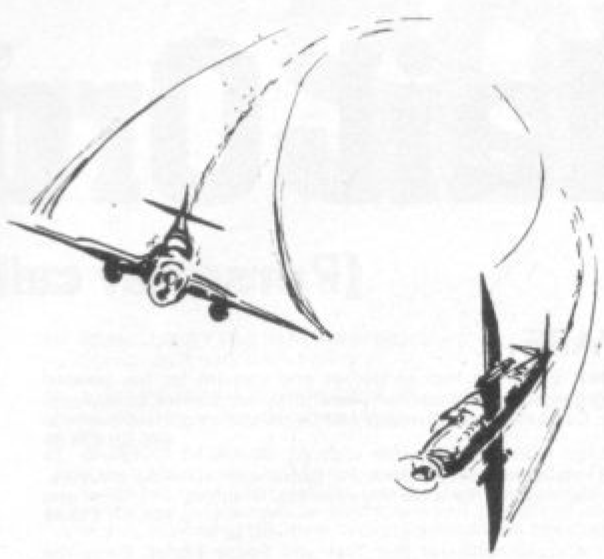
At the end of the game the computer reads out your score and shows how long you lasted.

To play Air Attack you use four keys and a space bar.

- Key "4" places your A.A. gun in the horizontal.
- Key "5" places your A.A. gun at a diagonal angle.
- Key "6" places your A.A. gun in a vertical position.
- Key "A" fires your A.A. gun.
- The "Space" bar fires your rocket launcher.



```
1 GOTO5000
5 PRINT"□":N=70:TI$="000000"
10 A$="▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
20 TS=32768:P=TS+863:DIMB$(5)
30 FORB=TS+961TOTS+1000:POKEB,160:NEXTB
31 PRINTA$"▒▒────────────────────────────────────▒"
35 B$(0)="▒▔▒":B$(1)="▒▔▒"
40 PRINTA$TAB(20)".T ▒▒          ▒"
45 PRINTA$TAB(23)".T]━▒▒▔▒▒\ ▛
```



```
100 IFII=1THEN140
105 A=INT(RND(1)*2)
110 PRINTA$B$(A)
120 PRINTA$"▮"
130 POKETS+959,32
140 Z=PEEK(166)
141 IFVG=1THEN143
142 IFFG<12THENIFZ=6THEN1100
143 IFVA=1THEN200
144 IFZ=48THEN1000
150 IFZ=42THENN=70:POKEP,N
160 IFZ=34THENN=28:POKEP,N
170 IFZ=41THENN=93:POKEP,N
```

```
175 POKEP+1,121
200 IFK=3THEN2015
210 IFINT(RND(1)*5)=2THENK=3:GOTO2000
990 GOTO100
1000 IFN=70THENQ=-1
1010 IFN=28THENQ=-41
1020 IFN=93THENQ=-40
1030 FORT=1TO15
1040 W=Q*T+P:POKEW,N
1050 IFPEEK(W+Q)=32THEN1060
1055 POKEW,32:GOTO1500
1060 POKEW,32:NEXTT
1070 GOTO100
1100 FG=FG+1
1105 FORV=1TO20
1110 O=V*-41+P+5:POKEO,28
1120 IFPEEK(O+-41)=32THEN1140
1130 POKEO,32:GOTO1500
1140 POKEO,32:NEXTV
1150 GOTO100
1500 POKEX,42:POKEX+1,42:POKEX+2,42:POKEX+3,42:POKEX-39,42:POKEX+41,42
1501 POKEX-38,42:POKEX+42,42
1503 FORTT=1TO50:NEXTTT
1510 POKEX,32:POKEX+1,32:POKEX+2,32:POKEX+3,32:POKEX-39,32:POKEX+41,32
1520 POKEX-38,32:POKEX+42,32
1530 CC=CC+1:LP=0:K=0:GOTO100
2000 J=INT(RND(1)*25)
```

RUNS ON A PET IN 8K

```
2005 IFJ>19ANDVA=1THENJ=10
2010 IFJ>19THENJ=21
2015 LP=LP+2:IFLP>=36THEN2040
2016 X=J*40+TS+LP
2017 IFJ=21ANDLP=20THEN2250
2020 POKEX,127:POKEX+1,98:POKEX+2,121:POKEX+3,100:POKEX-1,32:POKEX-2,32
2021 IFLP>16THEN100
2022 IFINT(RND(1)*10)=5THEN2100
2024 GOTO100
2040 POKEX,32:POKEX+1,32:POKEX+2,32:POKEX+3,32
```

ATARI Mail Orde

(Personal callers

DYNACOMP

1. **FOREST FIRE!**: Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire while compensating for changes in wind, weather and terrain. Not protecting valuable structures can result in startling penalties. Life-like variables are provided to make FOREST FIRE! very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty. **24K (C) £15.99**

2. **NOMINOES JIGSAW**: A jigsaw puzzle on your computer! Complete the puzzle by selecting your pieces from a table consisting of 60 different shapes. NOMINOES JIGSAW is a virtuoso programming effort. The graphics are superlative and the puzzle will challenge you with its three levels of difficulty. Scoring is based upon the number of guesses taken and by the difficulty of the board set-up. **24K (C) £15.99**

3. **MONARCH: MONARCH** is a fascinating economic simulation requiring you to survive an 8-year term as your nation's leader. You determine the amount of acreage devoted to industrial and agricultural use, how much food to distribute to the populace and how much should be spent on pollution control. You will find that all decisions involve a compromise and that it is not easy to make everyone happy. **16K (C) £10.99**

4. **CHOMPELO: CHOMPELO** is really two challenging games in one. One is similar to NIM; you must bite off part of a cookie, but avoid taking the poisoned portion. The other game is the popular board game REVERSI. It fully uses the Atari's graphics capability, and is hard to beat. This package will run on a 16K system. **16K (C) £10.99**

5. **CRYSTALS**: A unique algorithm randomly produces fascinating graphic displays accompanied with tones which vary as the patterns are built. No two patterns are the same, and the combined effect of the sound and graphics is mesmerizing. CRYSTALS has been used in local stores to demonstrate the sound and colour features of the Atari. **24K (C) £9.99**

6. **SPACE TILT**: Use the game paddles to tilt the plane of the T.V. screen to "roll" a ball into a hole in the screen. Sound simple? Not when the hole gets smaller and smaller! A built-in timer allows you to measure your skills against others in this habit-forming action game. **16K (C) £9.99**

7. **MOVING MAZE: MOVING MAZE** employs the games paddles to direct a puck from one side of a maze to the other. However, the maze is dynamically (and randomly) built and is continually being modified. The objective is to cross the maze without touching (or being hit by) a wall. Scoring is by an elapsed time indicator, and three levels of play are provided. **16K (C) £9.99**

8. **ALPHA FIGHTER**: Two excellent graphics and action programs in one. ALPHA FIGHTER requires you to destroy the alien starships passing through your sector of the galaxy. ALPHA BASE is in the path of an alien UFO invasion; let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score! ALPHA FIGHTER will run on 16K systems. **24K (C) £11.99**

9. **THE RINGS OF THE EMPIRE**: The Empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. The exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players. **16K (C) £15.99**

10. **INTRUDER ALERT**: This is a fast paced graphics game which places you in the middle of the "Dreadstar" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems. **16K (C) £15.99**

11. **GIANT SLALOM**: This real-time action game is guaranteed addictive. Use the joystick to control your path through slalom courses consisting of both open and closed gates. Choose from different levels of difficulty, race against other players or simply take practice runs against the clock. GIANT SLALOM will run on 16K systems. **16K (C) £11.99**

12. **TRIPLE BLOCKARD: TRIPLE BLOCKARD** is a two-to-three player graphics and sound action game. It is based on the classic video arcade game which millions have enjoyed. Using the Atari joysticks, the object is to direct your blockading line around the screen without running into your opponent(s). Although the concept is simple, the combined graphics and sound effects lead to "high anxiety". **16K (C) £12.99**

13. **MOON PROBE**: This is an extremely challenging "lunar lander" program. The user must drop from orbit to land at a predetermined target on the moon's surface. You control the thrust and orientation of your craft plus direct the rate of descent and approach angle. **16K (C) £9.99**

14. **SPACE TRAP**: This galactic "shoot'em up" arcade game places you near a black hole. You control your spacecraft using the joystick and attempt to blast as many of the alien ships as possible before the black hole closes about you. **16K (C) £12.99**

15. **STUD POKER**: This is the classic gambler's card game. The computer deals the cards one at a time and you (and the computer) bet on what you see. The computer does not cheat and usually bets the odds. However, it sometimes bluffs! Also included is a five card draw poker betting program. This package will run on a 16K ATARI. Colour, graphics, sound. See review in Compute. **16K (C) £10.99**

CRYSTALWARE

16. **FANTASYLAND 2041**: Enter the Hall of Heroes and prepare for the greatest fantasy role-playing game you will see for years to come. Survive Congoland, Arabia, King Arthur, Captain Nemo, Olympus and Dante's Inferno. Uses over 400 hires screens. **48K (D) £34.99**

17. **HOUSE OF USHER**: Haunted house adventure game with scrolling graphics. Wander the creepy hallways of the three storey castle. Graphics, animation and sound. **48K (D) £19.99**

18. **GALACTIC QUEST**: A combination of Star Trek and Space Trader. Battle the animated Vegon fighters as you warp from galaxy to galaxy. Landing and trading with hundreds of planets. Super hires graphics and sound. **48K (D) £19.99**

19. **SANDS OF MARS**: Voyage to Mars. Journey across the terrain of Mars, explore the mystery of the ice maze. Hires graphics. 2 discs. **48K (D) £26.99**

20. **BENEATH THE PYRAMIDS**: Find your way through the perilous chambers of the pyramids to discover a golden statue of the cat goddess, Bast. Hires graphics, sound. Your little man actually moves through the corridors which you can see on the screen. **48K (D) £19.99**

21. **WORLD WAR III**: A real time action war game. A map display of Iran and Iraq with 128 separate types of units. Move nuclear submarines and battleships through two world wars. **48K (D) £19.99**

22. **WATERLOO**: Napoleon's final battle. Using the same equipment, forces, opponents and terrain as he did. Historically accurate and extremely complex. **48K (D) £32.99**

ATARI PROGRAM EXCHANGE

23. **DATA MANAGEMENT SYSTEM**: Ideally suited for short records such as records, tape and book catalogues; telephone and address directories. **32K (D) £20.50**

24. **BLACKJACK TUTOR**: Good graphics make this an enjoyable and challenging opponent. Plans to full casino rules. **16K (C) £16.75**

25. **VIDEO MATHS FLASHCARDS**: A good and amusing maths tutor for the younger generation. **8K (C) £11.25**

26. **747 LANDING SIMULATOR**: Land your 747 jet safely with joystick control. Cockpit graphics of instrumentation and runway. Mid-air collisions, auto-pilot, air turbulence etc. **24K (C) £16.75**

27. **EASTERN FRONT (1941)**: Stunning graphics make this the best war game yet on a micro. Fine scrolling, as many as 18 colours, battle simulation. An absolute must this one. **16K (C) £30.25**

28. **CODECRACKER**: A computer implementation of a widely know game of LOGIC. **8K (C) £11.25**

29. **DOMINATION**: 1 to 5 players compete for power via economic means. Nuclear or conventional warfare. **24K (C) £16.75**

30. **TERRY**: A lightweight version of the artificial intelligence programs designed to imitate psychotherapists. **32K (C) £11.25**

31. **BUMPER POOL**: The colours, sounds used in this program create some pleasing graphics. It's easy to play the game, but not so easy to pocket the balls. **16K (C) £11.25**

32. **TACT TREK**: A tactical level combat game. A battle of wits and race against some very clever enemies. **24K (C) £13.50**

33. **SPACE TREK**: A strategy game based on the classic computer Star Trek game. **24K (C) £17.50**

34. **ANTHILL**: A two player game. A race to see who can escape to the top of the maze first. But it is constantly changing and a frantic blue ant keeps zapping you. **8K (C) £11.25**

35. **CENTURION**: A real time war game involving Romans and Barbarians, which calls for quick thinking to prevent you from being wiped out. **16K (C) £13.50**

36. **MINOTAUR**: A randomly generated maze game that is different every time. Try to escape before the Minotaur eats you. **24K (C) £11.25**

37. **OUTLAW/HOWITZER**: Two very popular arcade games with excellent graphics. Both games are a lot of fun and a must for every computer owner. **24K (C) £16.75**

38. **LOOKAHEAD**: An unusual graphical number game using some interesting strategies. Good fun for all. **24K (C) £11.25**

39. **BABEL**: A fast moving two-player game packed with sound effects and graphics. A race to build a tower to reach the stars. **16K (C) £16.75**

40. **AVALANCHE**: Based on the arcade game. This game appeals to all ages. Great use of sound and graphics. **16K (C) £16.75**

41. **GRAPHICS/SOUND DEMO**: Shows off the Atari's outstanding graphic and sound capabilities with stunning effect. **32K (D) £16.75**

42. **SOUND EDITOR**: Helps you create short sounds, such as clanks, croaks, rattles, etc. Very useful for the games programmer. **16K (C) £16.75**

43. **EXTENDED WSFN**: An educational graphics language developed for teaching programming concepts. The graphics this program generates can be dazzling. **16K (C) £19.00**

44. **DISK FIXER**: An invaluable utility for salvaging crashed or destroyed discs. Styled after the Atari DOS menu structure. **24K (D) £22.50**

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45. **BASIC UTILITY FOR RENUMBERING**: BURP should meet most of your renumbering needs. A very useful utility. **16K (C) £16.75**

46. **BASIC PROGRAM COMPRESSOR**: Masher not only makes your programs smaller, but also makes them run faster. **32K (D) £16.75**

47. **CAVERNS OF MARS**: Fly your attacking spacecraft right into the bowels of an enemy Martians base, blasting away at fuel dumps and Martian fighters as you twist and veer from sodden, cavern rock lizards. The combination of stark haunting subterranean graphics and the fast-paced continuous battle action makes this one of the most exciting games on a computer. **16K (C)**

ADVENTURE by Scott Adams

48. **ADVENTURELAND**: You wander through an enchanted world trying to recover the 13 lost treasures. You'll encounter wild animals, magical beings, and many other perils and puzzles. Can you rescue the Blue Ox from the quicksand? Or find your way out of the maze of pits? Happy Adventuring... **24K (C) £16.50**

49. **PIRATES ADVENTURE**: "Yo ho ho and a bottle of rum..." You'll meet up with the pirate and his daffy bird along with many strange sights as you attempt to go from your London flat to Treasure Island. Can you recover Long John Silver's lost treasures? Happy sailing, matey. **24K (C) £16.50**

50. **MISSION IMPOSSIBLE ADVENTURE**: Good morning, your mission is to ... and so it starts. Will you be able to complete your mission on time? Or is the world's first automated nuclear reactor doomed? This one's well named. It's hard, there is no magic, but plenty of suspense. Good luck ... **24K (C) £16.50**

51 **VOODOO CASTLE**: Count Cristo has had a fiendish curse put on him by his enemies. There he lies, with you his only hope. Will you be able to rescue him or is he forever doomed? Beware the Vooodoo man... **24K (C) £16.50**

52 **THE COUNT**: You wake up in a large brass bed in a castle somewhere in Transylvania. Who are you, what are you doing here, and WHY did the postman deliver a bottle of blood? You'll love this ADVENTURE, in fact, you might say it's Love at First Byte... **24K (C) £16.50**

53. **STRANGE ODYSSEY**: Marooned at the edge of the galaxy, you've stumbled on the ruins of an ancient alien civilization complete with fabulous treasures and unearthly technologies. Can you collect the treasures and return or will you end up marooned forever?.... **24K (C) £16.50**

54. **MYSTERY FUN HOUSE**: Can you find your way completely through the strangest Fun House in existence, or will you always be kicked out when the park closes? **24K (C) £16.50**

55. **PYRAMID OF DOOM**: An Egyption Treasure Hunt leads you into the dark recesses of a recently uncovered Pyramid. Will you recover all the treasures or more likely will you join its denizens for that long eternal sleep? **24K (C) £16.50**

56. **GHOST TOWN**: Explore a deserted western mining town in search of 13 treasures. From rattlesnakes to runaway horses, this ADVENTURE's got them all! Just remember, Pardner, they dpn't call them Ghost Towns for nothin'. (Also includes new bonus scoring system!) **24K (C) £16.50**

57. **SAVAGE ISLAND — PART 1**: WARNING FOR EXPERIENCED ADVENTURERS ONLY! A small island in a remote ocean holds an awesome secret. Will you be the first to uncover it? NOTE: This is the first of a larger multipart Adventure; it will be necessary to purchase additional packages to complete the entire Adventure. **24K (C) £16.50**

58. **SAVAGE ISLAND — PART 2**: After struggling through Part 1, you have the consolation of knowing its half over. This concludes this two part ADVENTURE it requires you have completed #10 and received the password to start #11. **24K (C) £16.50**

59. **12 GOLDEN VOYAGES**: The King lies near death in the Royal Palace — you have only three days to bring back the elixir needed to rejuvenate him. Journey through the lands of magic fountains, sacred temples, stormy seas, and gold, gold, GOLD! Can you find the elixir in time? **24K (C) £16.50**

60. **ANGLE WORMS/CROLAN DIVERSION**: Each player attempts to prevent his growing worm from hitting an obstacle! Each worm may fire a projectile from its head to try and shorten its own length. Watch for the walls. **8K (C) £12.50**

61. **MOUNTAIN SHOOT**: Pick your powder and pick your angle as you plug away over the mountain. Great sound and superb colour. Has special limited powder version too for greater challenge. **16K (C) £12.50**

62. **SUNDAY GOLF**: Neither rain, nor snow, nor threat of hail, will keep the Sunday golfer from this course. Grab your clubs and head for the fairways. This course is never closed. **16K (C) £12.50**

63. **LUNAR LANDER**: Colour graphics, 4 voice sound. Using the player missile graphics capabilities of the Atari, you must guide the module carefully across the landscape. Multi skill levels. Excellent graphics. **24K (C) £12.50**

64. **DEFLECTION**: A fast moving arcade game with simple rules and many skill levels. Will keep you and all your kids occupied for hours and hours. Early reports indicate this program has addictive qualities. Also including Simon. **8K (C) £12.50**

65. **STAR TREK 3.5**: By Lance Nicklaus. Classic Star Trek with Action Sound Effects. 3-D galaxy made up of 192 quadrants, includes stars, planets, black holes and a pulsar. Amazing visual displays etc. **32K (C) £16.50**

66. **GHOST HUNTER**: Rid the mansion on Huckleberry Hill of Ghosts. An exciting, fast action, arcade type game using excellent sound and graphics. **16K (C) £24.50**

67. **FROG**: Solve the problem of the Frogs by jumping over each other to achieve the correct order. Fun for all. **16K (C) £9.95**

SANTA CRUZ/TRICKY TUTORIALS

68. **DISPLAY LISTS**: Teaches you how to alter the screen format of small and large text on the screen together and high and low res graphics. **16K (C) £9.95**

69. **HORIZONTAL/VERTICAL SCROLLING**: Enables graphics or text to be moved up, down or sideways. You could move only the text on the bottom half of the screen or create a map and scroll smoothly over it. **16K (C) £9.95**

70. **PAGE FLIPPING**: Learn how to have the computer draw the next page you want to see while you are still looking at the previous page then flip to it instantly. A very useful program. **16K (C) £9.95**

71. **BASICS OF ANIMATION**: This program shows you how to animate simple shapes (with sound) using Print & Plot commands and also has a nice Player/Missile graphics game you can play with. **16K (C) £9.95**

72. **PLAYER/MISSILE GRAPHICS**: This program shows you how to create a simple shape called a player, then takes you through over 25 examples to create a complete business application and a small game. **32K (C) £19.95**

73. **SOUND**: Unless you have spent many hours experimenting with the four voice channels of the Atari, you will learn a lot from this one. With many examples of special sound effects. **16K (C) £9.95**

74. **MINI WORD PROCESSOR**: Requires printer and 32K of memory. Suitable for simple editing of text, and storage of text up to 5 pages of length or either disc or tape. Great value. **32K (C) £9.95**

75. **KIDS PROGRAM 1**: Three programs on one tape. Maths: test your child's maths skills; Dialogue: talk to your computer; Lost Treasure: search over a small island looking for a treasure. **16K (C) £9.95**

76. **BOB'S BUSINESS**: Programs on this tape include Amortisation Table, Monthly mortgage payment, Depreciation schedule, Savings and Loan Averages, Square Feet and Yards, Paycheck Calculation, Interest on Investment, Mortgage Companion, Projects Expenses, Monthly Bar Graphics, Decimal/Hex Conversions, US/Metric Conversions, Checkbook Balancer. **32K (C) £9.95**

77. **KIDS 2**: Three more programs for your children. Spelling Bee, input and test those monthly tests; jumbled up letters give a lot of fun; Touch, follow the computers instructions and stop yourself laughing. **16K (C) £9.95**

78. **THE GRAPHICS MACHINE**: Type in simple commands like line, boc, circle, polygon, fill and save screen to get hires pictures, you can save and retrieve in seconds. Several demos are included in this great program. **48K (D) £13.50**

79. **PLAYER PIANO**: Turns your keyboard into a mini piano. Create your own songs, save on cassette or disc, up to 400 notes in memory. **24K (C) £9.95**

THORN EMI

80. **HUMPTY DUMPTY & JACK AND JILL**: 48 entertaining and educational puzzles based on nursery rhyme themes from pre-school to adult. **16K (C) £19.95**

81. **HICKORY DICKORY DOCK & BAA, BAA BLACK SHEEP**: As above. **16K (C) £19.95**

82. **BRITISH HERITAGE JIGSAW PUZZLES**: 32 electronic jigsaw puzzles based on four famous British themes. **16K (C) £19.95**

83. **EUROPEAN SCENE JIGSAW PUZZLES**: As above only set in Europe. **16K (C) £19.95**

84. **DARTS**: Over 300 games options based on the pub game of darts for up to 4 players. **16K (C) £19.95**

85. **CRIBBAGE & DOMINOES**: 10 variations of these popular pub games to play against the computer. **16K (C) £14.95**

86. **SNOOKER & BILLIARDS**: Full British championship rules and practice options for these popular games. **16K (C) £19.95**

87. **TOURNAMENT POOL & 8 BALL POOL**: The American tournament rules version plus British 8 ball. **16K (C) £19.95**

88. **ROTATE & TILT**: 2 x 2, 3 x 3 and 4 x 4 variations of the three dimensional cube puzzle, plus a game of skill with over 300 variations. **16K (C) £14.95**

89. **HOME FINANCIAL MANAGEMENT**: Financial planning and control specially designed for the needs of the British home. Available early 1982.

90. **JUMBO JET LANDER**: A flight simulator to take off, fly and land a Jumbo Jet. Available end of February 1982. **16K (C) £29.95**

91. **SUBMARINE COMMANDER**: A World War II offensive submarine patrol simulator. Available end of February 1982. **16K (C) £24.50**

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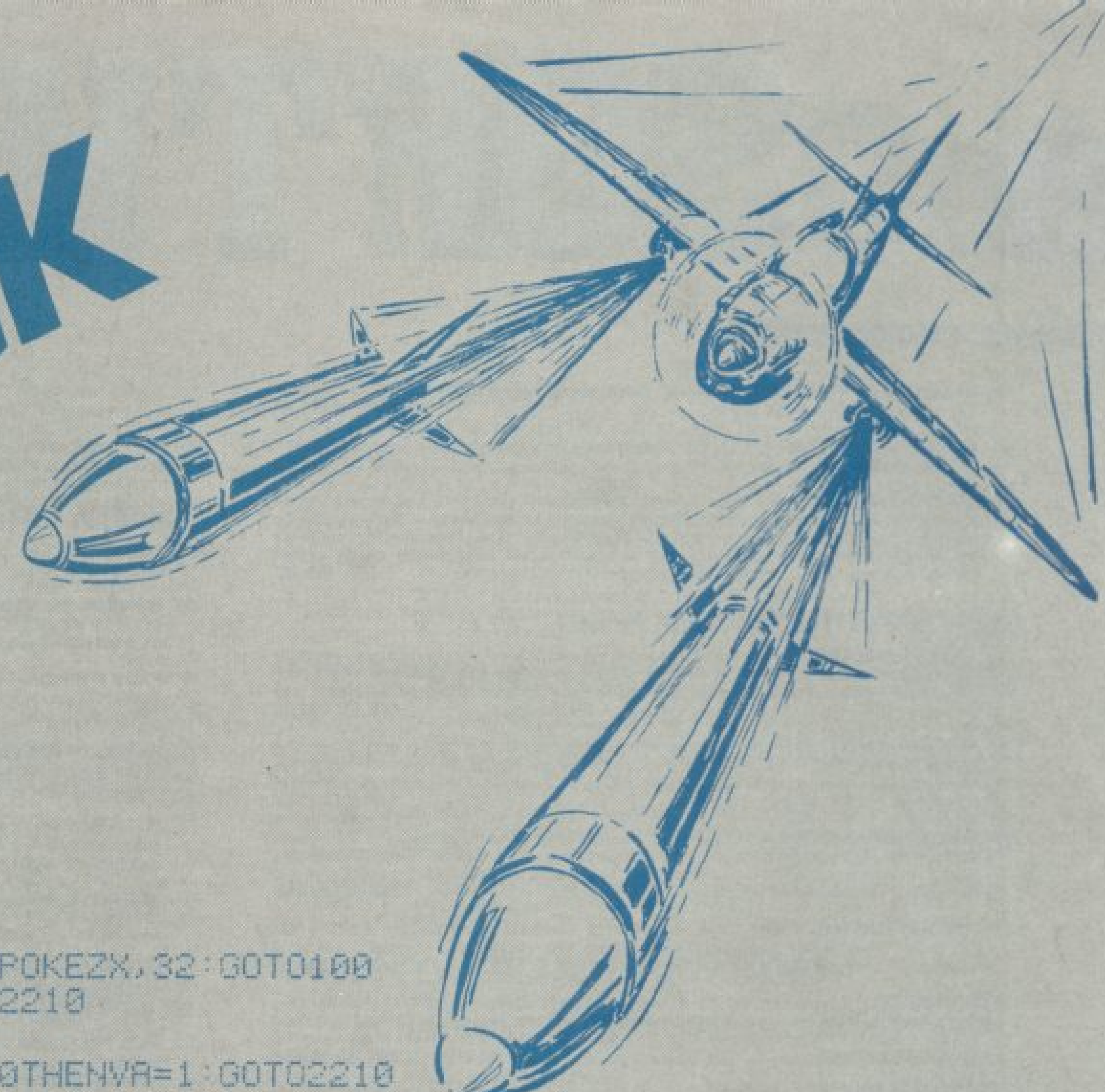
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Cheque No. .... for £ .... enclosed.

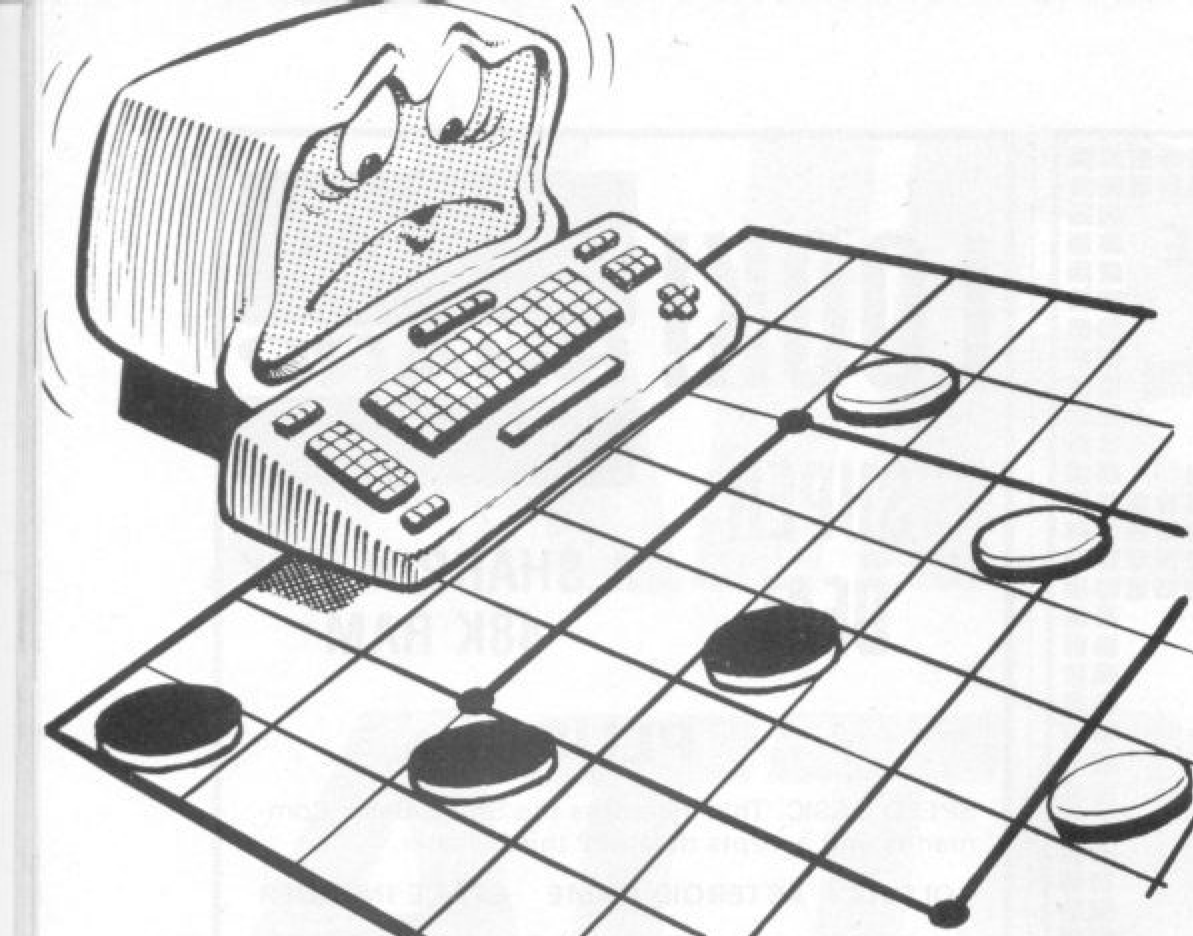
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AIR ATTACK



```
2200 IFBN=247ORBN=227THENPOKEZX,32:GOTO100
2201 IFBN=77THENVG=1:GOTO2210
2202 IFBN=160THEN2250
2203 IFBN=28ORBN=93ORBN=70THENVA=1:GOTO2210
2204 IFBN=103THENPOKEZX+42,32:GOTO2210
2205 IFBN=121THENPOKETS+863,32:VA=1:GOTO2210
2206 IFBN=95THENII=1:POKETS+900,32
2210 POKEZX,32:POKEZX+41,42:FORIU=1TO30:NEXTIU:POKEZX+41,32
2220 GOTO100
2250 PRINTA$TAB(20)"][illegible]"
2260 PRINTA$TAB(19)"]][illegible]"
2270 PRINTA$TAB(18)"]]][illegible]"
2280 PRINTA$TAB(17)"]]]][illegible]"
2300 PRINTA$TAB(20)"]                    "
2310 PRINTA$TAB(15)"]]                              "
2320 PRINTA$TAB(17)"]]]                              "
2330 PRINTA$TAB(17)"]]]]                              "
2500 PRINT"]Q"TAB(10)"QQQQYOU HIT "CC" PLANES"
2510 PRINTTAB(12)"QIN "MID$(TI$,3,2)" MINUTES"
2520 PRINTTAB(12)"QAND "RIGHT$(TI$,2)" SECONDS"
2525 PRINTTAB(9)"QYOU USES "FG" ROCKETS"
2530 PRINTTAB(11)"QANOTHER GO (Y/N)"
2540 GETU$
2550 IFU$="Y"THEN5000
2560 IFU$="N"THENPRINT"]":END
2570 GOTO2540
5000 PRINT"]YOU ARE THE CAPTAIN OF A SHIP."
5150 PRINT"QYOU ARE UNDER ATTACK BY ENEMY PLANES."
5160 PRINT"QTHE OBJECT OF THE GAME IS TO SHOOT DOWN"
5170 PRINT"QAS MANY ENEMY PLANES AS YOU CAN BEFORE"
5180 PRINT"QTHEY BLOW YOU UP."
5190 PRINT"QYOU HAVE A ROCKET LAUNCHER AND A.A. GUNS"
5195 PRINT"YOU HAVE ONLY 12 ROCKETS"
5200 PRINT"QTO FIRE THE LAUNCHER PRESS 'SPACE'"
5210 PRINT"QTO FIRE THE A.A. GUNS PRESS 'A'"
5220 PRINT"QTO MOVE THE GUN USE '4','5','6'"
5225 PRINT"QBIGGER THE NUMBER HIGHER THE GUN."
5230 PRINT"QQQQQRPRESS SPACE TO START"
5240 GETV$:IFV$<>" "THEN5240
5250 CLR:GOTO5
```



REV

RUNS ON A SINCLAIR ZX81 IN 16K

THE GAME IS PLAYED ON AN 8 X 8 BOARD. YOUR COUNTERS ARE "O", AND THE COMPUTER"S "▣".

THE FIRST FOUR COUNTERS ARE IN PLACE. YOU TAKE TURNS TO PLAY A COUNTER SO THAT IT IS ADJACENT TO AN ENEMY COUNTER, SANDWICHING ONE OR MORE ENEMY PIECES IN LINE BETEEN IT AND ANOTHER FRIENDLY PIECE. ANY PIECES SO CAPTURED BECOME YOURS.

IF YOU ARE UNABLE TO CAPTURE, THE TURN IS FORFEIT.

TO MAKE YOUR MOVE, ENTER THE COLUMN, THEN THE ROW, AND PRESS NEWLINE. IF YOU CAN"T GO THEN ENTER "N".

THE SCREEN BLANKS FOR 10-20 SECONDS WHILE SELECTING A MOVE.

PRESS "NEWLINE" WHEN READY.

```
  1 2 3 4 5 6 7 8
 +-+-+-+-+-+-+-+-+
1:.:.:.:.:.:.:.:.:
 +-+-+-+-+-+-+-+-+
2:.:.:.:.:O:.:.:.:
 +-+-+-+-+-+-+-+-+
3:.:.:▣:▣:▣:▣:.:.:
 +-+-+-+-+-+-+-+-+
4:.:.:O:▣:▣:.:.:.:
 +-+-+-+-+-+-+-+-+
5:.:.:▣:▣:O:.:.:.:
 +-+-+-+-+-+-+-+-+
6:.:▣:▣:.:.:O:.:.:
 +-+-+-+-+-+-+-+-+
7:.:.:.:.:.:.:.:.:
 +-+-+-+-+-+-+-+-+
8:.:.:.:.:.:.:.:.:
 +-+-+-+-+-+-+-+-+

 PLEASE ENTER MOVE
```

```
   1 REM *******"?PIRND RETURN ▣
▣""****5P" GOSUB ?▙RND▣ GOSUB ??
?E£RND FOR ;STR$ SGN Y. GOSUB ▙
STEP STR$ ▣ FAST GOSUB ?6▙RND LP
RINT VAL FAST 5▘RNDQ 7Q 7Q 5▒RND
▗▝▒7("E▗RND* LPRINT AT ▣CPEEK SGN
 TAN SGN STR$ . FAST ?A ACS ?C▝9
;SGN *5▘RND RETURN .4▝07 RETURN
04▝07 RETURN ▣4▝0 FOR /ATN
   3 REM
   5 REM ENTER STATEMENT 1 USING
FUNCTION KEYS WHERE APPROPRIATE.
THE "" IN LINE 2 IS SHIFT Q. THE
ONLY SPACES ENTERED FOLLOW THE 3
Q"S IN LINE 5 AND THE A, LINE 7.

  10 POKE 16522,68
  11 POKE 16537,91
  12 POKE 16542,82
  13 POKE 16543,77
  14 POKE 16544,66
  15 POKE 16561,82
  16 POKE 16590,126
  17 POKE 16602,110
  18 POKE 16606,125
  19 POKE 16612,126
  26 DIM D(4)
  27 LET D(1)=2
  28 LET D(2)=66
  29 LET D(3)=64
  30 LET D(4)=68
  35 PRINT "DO YOU WANT INSTRUCT
IONS?"
  40 INPUT A$
  45 IF A$(1)="Y" THEN GOSUB 170
0
  50 CLS
  52 RAND
  55 LET R=70
  57 FAST
  60 DIM A(3,3)
  61 LET A(1,1)=1
  62 LET A(2,2)=1.5
  63 LET A(1,3)=2
  64 LET A(3,1)=2
  65 LET A(2,3)=2.5
  66 LET A(3,2)=2.5
  67 LET A(3,3)=3
  68 DIM F(8,8)
  69 LET F(1,1)=15
  70 LET F(3,3)=10
  72 LET F(1,2)=1
  73 LET F(1,3)=12
  74 LET F(1,4)=8
  75 LET F(2,3)=6
  76 LET F(2,4)=6
  77 LET F(3,4)=10
  78 FOR A=1 TO 8
  79 FOR B=1 TO 8
  80 LET X=4.5-ABS (A-4.5)
  81 LET Y=4.5-ABS (B-4.5)
  82 IF X<=Y THEN GOTO 85
  83 LET X=Y
  84 LET Y=4.5-ABS (A-4.5)
  85 LET F(A,B)=F(X,Y)
  86 NEXT B
  87 NEXT A
  89 LET T=0
  90 LET GRID2=16514
 100 LET MODE=16519
 105 POKE MODE+1,64
 110 LET SPACE=16516
 120 LET WHITE=16517
 130 LET BLACK=16518
 140 LET DFILE=PEEK 16396+256*PE
EK 16397
```

VERSI

6K

REMLOAD RUNS IN JUST OVER 1K

BY GORDON STEVENS

Take on your Sinclair at the recently revitalised game of Reversi.

The old English game of Reversi — now popular, since being re-invented as Othello — is a two-player strategy game. Those of you who have been following Tom Napier's occasional column on the game in this magazine will know that computers are capable of beating us poor humans. Your Sinclair may not actually be able to defeat you every time but it will give all but the best Reversi players a real challenge.

Gordon Stevens has utilised some machine code in his program which needs careful handling on the Sinclair.

The USR routine is used for a preliminary screening procedure in the selection of the computers best move. This allows the main part of the evaluation routine to be written in Basic while still achieving a good response time.

The machine code section is held in REM statement 1, entry point 4095H (16533 in decimal) Locations 4082H-4087H (16514-16519 Dec) are used for transferring data to and from the Basic program via PEEK and POKE commands.

REM statement 1 can be written from the keyboard, provided that the function keys are used where appropriate.

Commands such as RETURN can be entered by first using THEN followed by the command and deleting THEN afterwards. Statements 10 to 19 modify statement 1 where the code cannot be loaded directly.

Alternatively the routine may be loaded via a Hex encoder, such as Remload into blank REM statement from the Hex dump given at the end of the Reversi program.

Strategy is based on three main factors:

- A value for each position on the board, held in array "F" and which is modified when certain positions have been occupied.
- The nature of the end positions formed by the newly laid piece. For example a line ending at an edge position at each end is worth more than one with a space at each end. The values are held as a table in array A.
- The number of pieces captured. The significance of this increases as the game progresses.
- More tips on Reversi will be coming in our May issue.

```
 150 PRINT "  1 2 3 4 5 6 7 8"
 160 FOR A=1 TO 9
 170 PRINT AT A+A,0;A
 180 FOR B=1 TO 9
 190 PRINT AT A+A-1,B+B-1;"+-";A
T A+A,B+B-1;":."
 200 NEXT B
 210 PRINT AT A+A-1,18;" ";TAB 1
8;" "
 220 NEXT A
 230 PRINT AT 16,0;"
 "
 240 PRINT AT 8,8;"■:O";AT 10,8;
"O:■"
 245 SLOW
 250 PRINT AT 19,1;"PLEASE ENTER
 MOVE"
 260 INPUT A$
 270 PRINT AT 19,1;"
 "."                              "
 275 IF A$="N" THEN GOTO 515
 280 IF LEN A$<>2 THEN GOTO 250
 290 IF A$(1)<"1" OR A$(1)>"8" O
R A$(2)<"1" OR A$(2)>"8" THEN GO
TO 250
 300 LET X=VAL A$(1)
 310 LET Y=VAL A$(2)
 330 LET POS=DFILE+Y*66+X+X+1
 380 IF PEEK POS<>27 THEN GOTO 2
50
 440 LET PRINT=1
 460 LET HOME=52
 470 LET AWAY=180
 500 GOSUB 800
 510 IF NOT VALID THEN GOTO 250
 512 LET R=R-1
 515 FAST
 520 LET HOME=180
 530 LET AWAY=52
 540 LET HA=BLACK
 550 LET AA=WHITE
 560 POKE MODE,133
 575 GOSUB 1400
 585 SLOW
 590 IF MAX THEN GOTO 700
 600 IF A$="N" THEN GOTO 1300
 610 PRINT AT 20,1;"I CAN""T GO"
 690 GOTO 250
 700 LET POS=BEST
 710 LET PRINT=1
 720 GOSUB 800
 725 LET R=R-1
 730 GOTO 250
 800 LET VALID=0
 810 LET S=1
 820 FOR A=1 TO 4
 825 LET D=D(A)
 840 GOSUB 1040
 850 IF P=HOME THEN GOSUB 1105
 860 LET Q=(P<>27)*2+(P<>AWAY)
 870 LET D=-D(A)
 880 GOSUB 1040
 890 IF PRINT THEN GOTO 940
 900 IF P=HOME THEN GOSUB 1105
 910 LET P=A(Q,(P<>27)*2+(P<>AWA
Y))
 920 LET T=T+P
 930 IF NOT P THEN LET S=2
 940 NEXT A
 950 IF NOT VALID THEN RETURN
 960 LET GRID=POS-DFILE
 970 LET Y=INT (GRID/66)
 980 LET X=(GRID-Y*66-1)/2
 990 LET T=(T+F(X,Y)*R/25)/S
1000 IF NOT PRINT THEN RETURN
1002 IF X<>1 AND X<>8 OR Y<>1 AN
```

```
D Y<>8 THEN RETURN
1004 LET XD=SGN (4-X)
1006 LET YD=SGN (4-Y)
1008 LET F(X,Y+YD)=9
1010 LET F(X+XD,Y)=9
1012 LET F(X+XD,Y+YD)=5+(HOME=18
0)*3
1014 LET F(X+3*XD,Y)=10
1016 LET F(X,Y+YD*3)=10
1018 RETURN
1040 FOR B=1 TO 7
1050 LET P=PEEK (POS+B*D)
1060 IF P=AWAY THEN NEXT B
1065 IF B=1 THEN RETURN
1070 IF P=HOME THEN GOTO 1090
1075 LET P=AWAY
1080 RETURN
1090 LET VALID=1
1095 IF PRINT THEN GOTO 1140
1100 LET T=T+B+(A>2)
1105 LET EXT=POS+B*D
1110 FOR B=1 TO 7
1115 LET P=PEEK (EXT+B*D)
1120 IF P=HOME THEN NEXT B
1130 RETURN
1140 FOR C=0 TO B-1
1150 FOR E=1 TO 3
1160 POKE POS+C*D,61
1170 POKE POS+C*D,HOME
1180 NEXT E
1190 NEXT C
1195 LET P=AWAY
1200 RETURN
1300 LET POS=69+DFILE
1304 LET WH=0
1306 LET BL=0
1308 PRINT AT 21,0;"COUNTING SCO
RE:"
1310 FOR A=0 TO 7
1320 FOR B=0 TO 7
1330 LET C=PEEK (POS+A*2+B*66)
1340 LET BL=BL+(C=180)
1350 LET WH=WH+(C=52)
1360 NEXT B
1370 NEXT A
1380 PRINT AT 21,0;"WHITE: ";WH;
" BLACK ";BL
1390 STOP
1400 LET PRINT=0
1405 LET MAX=0
1410 POKE GRID2,45
1420 POKE GRID2+1,0
1440 IF NOT USR 16533 THEN RETUR
N
1500 LET POS=DFILE+PEEK GRID2+25
6*PEEK (GRID2+1)-1
1520 LET T=0
1530 GOSUB 800
1550 IF NOT VALID THEN GOTO 1440
1570 LET T=T+RND
1580 IF T<=MAX THEN GOTO 1440
1630 LET MAX=T
1640 LET BEST=POS
1650 GOTO 1440
1700 CLS
1710 PRINT AT 0,7;"REVERSI/OTHEL
LO",,TAB 2;"THE GAME IS PLAYED O
N AN 8 X 8BOARD. YOUR COUNTERS A
RE ""O"",ANDTHE COMPUTER""S ""■"
"."
1720 PRINT TAB 2;"THE FIRST FOUR
 COUNTERS ARE INPLACE. YOU TAKE
TURNS TO PLAY A",,"COUNTER SO THA
T IT IS ADJACENT","TO AN ENEMY C
OUNTER, SANDWICHINGONE OR MORE E
NEMY PIECES IN LINEBETEEN IT AND
 ANOTHER FRIENDLY  PIECE. ANY PI
ECES SO CAPTURED   BECOME YOURS.
"
1730 PRINT TAB 2;"IF YOU ARE UNA
BLE TO CAPTURE,","THE TURN IS FO
RFEIT."
1740 PRINT TAB 2;"TO MAKE YOUR M
OVE, ENTER THE","COLUMN, THEN TH
E ROW,  AND PRESSNEWLINE.  IF YO
U CAN""T GO THEN  ENTER ""N""."
1750 PRINT TAB 2;"THE SCREEN BLA
NKS FOR 10-20   SECONDS WHILE SE
LECTING A MOVE."
1760 PRINT TAB 2;"PRESS ""NEWLIN
E"" WHEN READY."
1770 INPUT A$
1780 RETURN
1800 FOR I=0 TO 3
1810 LET A$(4-I)=CHR$ (A-16*INT
(A/16)+28)
1820 LET A=INT (A/16)
1830 NEXT I
1840 RETURN
```

```
HEX DUMP OF FINAL FORM OF OPCODE
     ROUTINE IN STATEMEMT 1

4089    02 44 42 40 FE BC BE C0
4091    17 17 17 17 21 35 02 ED
4099    5B 82 40 A7 ED 52 4D 44
40A1    2A 0C 40 EB 19 D5 D1 3E
40A9    1B ED 81 E0 D5 A7 E5 ED
40B1    52 22 82 40 E1 C5 E5 21
40B9    84 40 36 00 23 36 00 23
40C1    36 00 21 88 40 06 09 23
40C9    10 0B 2A 87 40 7E E1 C1
40D1    A7 28 D3 D1 C9 D1 D5 1B
40D9    E5 6E 26 00 CB 7D 28 01
40E1    25 19 D1 7E 21 84 40 FE
40E9    1B 20 01 34 23 FE 34 20
40F1    01 34 23 FE B4 20 01 34
40F9    EB 18 CC

ENTRY POINT 4095H (16533D)
```

Remload displays and alters any byte of suitable memory using Hex coding.

It is just over 1K but deleting statement "2" will enable it to squeeze into the basic machine.

Enter a four character Hex address to display that address and its contents in Hex code. If Newline is pressed the next address is displayed with its contents.

If a four character address is entered instead, the program continues at that address.

The scroll function is used to give a continuous display.

The program may be used to load a REM statement, as indicated in Statement 1 and the other statements deleted or overwritten. Alternatively a section of memory may be reserved by previously resetting RAMTOP and using NEW.

Although we have printed the program as a help in loading Reversi, it would also have plenty of other uses for the Sinclair owner.

```
   1 REM THIS STARTS AT 4082H,16
514D
   2 REM PGM "REMLOAD"
  10 DIM A$(4)
  15 SCROLL
  20 GOSUB 290
  30 LET C=A
  40 PRINT A$;
  50 LET A=PEEK C
  60 GOSUB 200
  70 PRINT TAB 5;A$(3 TO )
  80 GOSUB 290
  90 IF I=3 THEN POKE C,A
 100 IF I=3 THEN PRINT AT 21,5;A
$( TO 2)
 140 SCROLL
 150 LET C=C+1
 160 IF I=5 THEN GOTO 30
 170 LET A=C
 180 GOSUB 200
 190 GOTO 40
 200 FOR I=0 TO 3
 210 LET A$(4-I)=CHR$ (A-16*INT
(A/16)+28)
 220 LET A=INT (A/16)
 230 NEXT I
 240 RETURN
 290 INPUT A$
 300 LET A=0
 310 FOR I=1 TO 4
 330 LET B=CODE A$(I)
 340 IF NOT B THEN RETURN
 345 LET A=A*16
 350 LET A=A+B-28
 360 NEXT I
 370 RETURN
```

RUNS ON AN ATARI IN 8K

WITH A JOYSTICK

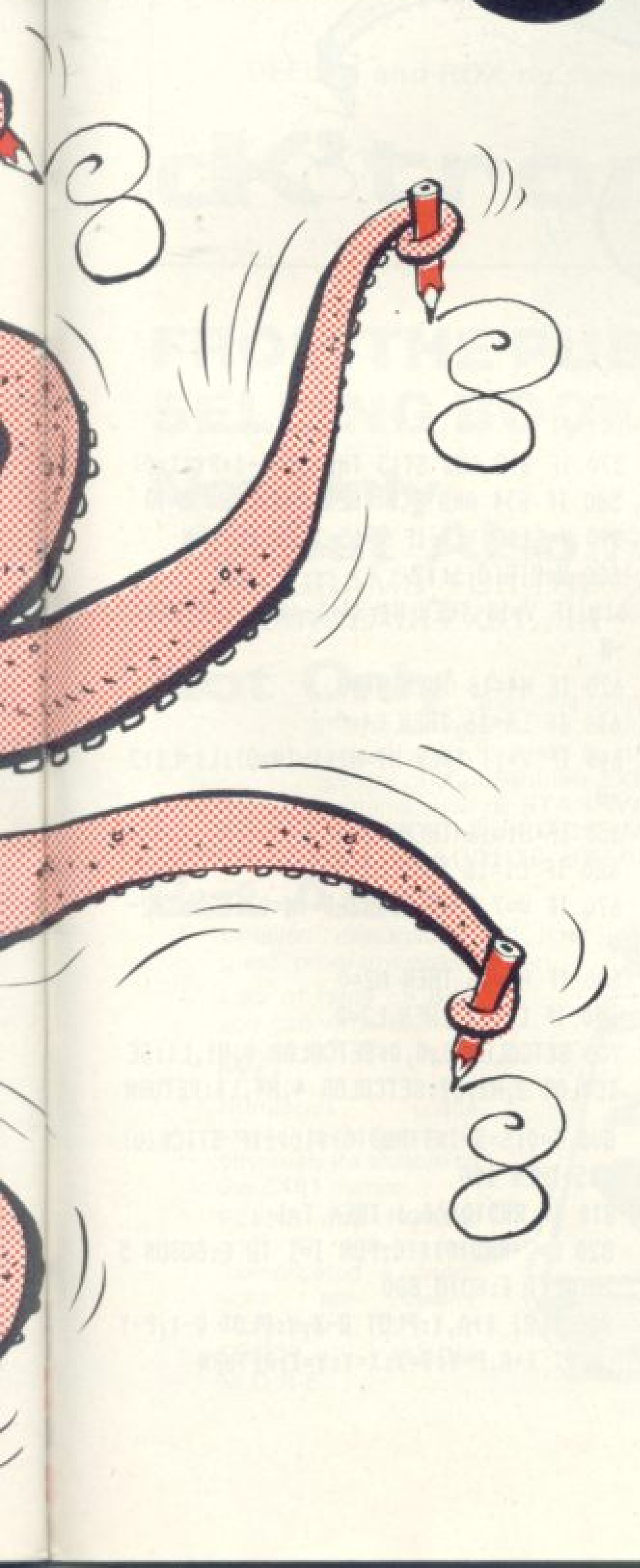
BY JAMES GARO

OCTA



ON

DRAW



If you thought Etch-a-Sketch was the last word in automated art, Octadraw will prove you wrong.

As the name suggests, Octadraw enables the player to draw in eight directions at once. This use of symmetry will suggest all kinds of new ideas to the amateur artist and produce some interesting results from those who previously believed they possessed no artistic bent whatsoever.

The program is designed for an Atari with 8K and at least one joystick.

Run the program, then press the start button at the right of the keyboard. You will see a blinking cursor in the centre of the screen. Using the joystick in slot #1, you may move the cursor around the screen. With the fire-button pressed, the cursor will leave a trail of colour as it moves. Seven mirror images of the line will also appear, three will match the cursor colour, and four will be a different colour.

Pressing the select button (just above start at the right of the keyboard) will select the computer to do the drawing, while you sit back and watch. When you wish to continue drawing, just move joystick #1 and hold it until the computer finishes the line it is currently drawing. You may then add to the computer's drawing.

Pressing the button with the word "clear" on it will erase the current picture.

If a joystick is placed in slot #2, you can control the colours that Octadraw uses. Pressing forward will change the background colour; pressing left changes one of the drawing colours while pressing right changes the other. Holding the fire-button down during any of these three operations will change not the colour but the luminance of the corresponding colour. With eight shades of 16 colours for each of the three parts of the drawing, there are over two million possible colour combinations!

VARIABLES USED

A=32: Added to x-value to centre drawing.

C=3: COLOUR value

H1, H2, H4: Colours used in SETCOLOUR x, Hx, Ly statements

I: Loop variable

KEY=764: PEEK address to determine which key has been pressed

L: Used in line 10 to create mixed mode display

Used in line 820 to determine length of line to be drawn by the computer

L1, L2, L4: Luminances used in SETCOLOUR x, Hx, Ly statements

P=95: Used to calculate reflections across X-axis

Q=127: Used to calculate reflections across Y-axis

AUTOMATED ART MADE EASY



S: In line 100 S is the value of STICK(0). This determines the direction in which the cursor will move.

In line 800, the computer "makes up" a value for S, and this value determines the direction of cursor movement.

START=53279: PEEKing at this location reveals which of the START, SELECT, or OPTION buttons are pressed.

T: In line 500, T gives the status of the fire-button: 0 if pressed, 1 if not. This determines whether a line will be drawn or not.

Similarly, in lines 800 and 810 the computer "pretends" to press the fire-button about 9/10ths of the time. You may change this fraction by changing "0.1" in line 810 to some other fraction between 0 and 1.

V: Reflects any activity from joystick #2. This changes the colours of the drawing.

W: Tests for the fire-button on joystick #2. This affects the brightness of the colours.

X, Y: The coordinates of the point to be PLOTted.

Z: Temporary storage used when X and Y are switched at the end of the drawing subroutine.

```
10 GRAPHICS 0:POKE 752,1:L=6+PEEK(741)
+256*PEEK(742):POSITION 3,4:? "oCtA-dR
aW":POSITION 23,4:? "BY JAMES GARON"
20 POSITION 6,9:? "Press START"
30 SETCOLOR 2,2,4:SETCOLOR 4,2,4:SETCO
LOR 0,2,8:POKE L+4,7:POKE L+5,6:KEY=76
4:START=53279
40 IF PEEK(START)=7 THEN 40
50 X=47:Y=X:GRAPHICS 23:C=3:H1=12:L1=8
:H2=L1:L2=2:H4=L2:L4=H2:GOSUB 700:A=32
:P=95:Q=127
100 S=STICK(0):GOSUB 500:IF PEEK(START
)=5 THEN 800
110 GOTO 100
500 PLOT X+A,Y:COLOR 1:PLOT X+A,Y:T=ST
RIG(0)
520 COLOR C-C*T:GOSUB 900:COLOR 2-T-T:
GOSUB 900
540 IF PEEK(KEY)=54 THEN POKE KEY,0:GR
APHICS 23:X=47:Y=X:GOTO 700
550 IF S/2=INT(S/2) THEN Y=Y-1+P*(Y=0)
560 IF S=9 OR S=13 OR S=5 THEN Y=Y+1-P
*(Y=P)
570 IF S>8 AND S<13 THEN X=X-1+P*(X=0)
580 IF S>4 AND S<9 THEN X=X+1-P*(X=P)
590 V=STICK(1):IF V=15 THEN RETURN
600 W=STRIG(1)*2
610 IF V=14 THEN H4=H4+1-(W=0):L4=L4+2
-W
620 IF H4=16 THEN H4=0
630 IF L4=16 THEN L4=0
640 IF V=11 THEN H1=H1+1-(W=0):L1=L1+2
-W
650 IF H1=16 THEN H1=0
660 IF L1=16 THEN L1=0
670 IF V=7 THEN H2=H2+1-(W=0):L2=L2+2-
W
680 IF H2=16 THEN H2=0
690 IF L2=16 THEN L2=0
700 SETCOLOR 0,0,0:SETCOLOR 1,H1,L1:SE
TCOLOR 2,H2,L2:SETCOLOR 4,H4,L4:RETURN
800 T=0:S=5+INT(RND(0)*10):IF STICK(0)
<15 THEN 100
810 IF RND(0)<0.1 THEN T=1
820 L=2+RND(0)*10:FOR I=1 TO L:GOSUB 5
20:NEXT I:GOTO 800
900 PLOT X+A,Y:PLOT Q-X,Y:PLOT Q-X,P-Y
:PLOT X+A,P-Y:Z=X:X=Y:Y=Z:RETURN
```

ENTOM

```
 10 REM ENTOMB BY MURRAY ALLEN
 11 REM
 15 G.e
 20 P.$12;S=0;G=1;O=#B002;M=#8009;E=#8003
 30 DIM AA4;AA1=-32;AA2=1;AA3=-1;AA4=32;IN."DIFFICULTY 1-30"D
 40 G.d
 50 F.A=#8000 TO #81FF;?A=#A0;N.
 60 REM DRAW MAZE
 70 F.A=45 TO 549 S.84
 80 F.B=0 TO 30;IFR.%7>1 G.100
 90 B?(#8000+A)=#FF
100 N.
110 F.B=40 TO 70;IFR.%7>1 B?(#8000+A)=#FF
120 N.;N.
130 F.B=#801F TO #8244 S.40;?(B+30)=#FF;?(B-30) =#FF
140 ?B=#FF;?(B+1)=#FF;N.
150 F.A=0 TO 32;A?#8200=#FF;N.
160 F.A=1 TO D;B=A.R.%510+1;B?#8000=#8F;N.;T=D
170 REM START
180a?Q=#A0;?E=#FF;?M=#A3
190 Q=M
200 D=A.R.%4+1
210 E=E+AAD
220 IF E<#8000 E=E+32
230 IF ?E=#8F;S=S+1
240 IF(?(M+32)=#FF)&(?(M-32)=#FF)&(?(M-1)=#FF)&(?(M+1)=#FF)G.c
250 LI.RR0
260 IF?#80=52 M=M-32
270 IF?#80=54 M=M+32
280 IF?#80=39 M=M+1
290 IF?#80=38 M=M-1
300 IF(?#80=0)&(G=1)G=0;?(M+32)=#A0
310 IF(M>#81FF)    G.b
320 IF(M<#8000)M=Q
330 IF(?M=#FF) M=Q;?O=?O:4
340 IF?M=#8F S=S+1
350 G.a
360bP.$12,"you made it YOU SCORED",S';G.e
370cP.$12,"you're entombed"';G.e
```



RUNS ON AN ATOM IN 2K
BY MURRAY ALLEN

MB

Trapped in a collapsing labyrinth, it's a race against time to get to the exit before the roof caves in around you.

Murray Allen has come up with a simple but innovative game which requires some swift thinking to spot the way out before it's too late.

The noughts which appear in the maze are an additional way of judging your performance: how many can you run over on the way out.

There are several ways the game could be improved but as an idea, it is quite an original one and could well spawn several interesting progeny.

We look forward to hearing from any readers who build on Murray's idea.

You are represented on the screen by a (hash) symbol and have to reach the bottom of the screen. The control keys are: T- to go up; V- to go down; G- to go right; F- to go left.



```
380dP.$21;DIM RR1,P-1;L=#FE71
390[;:RR0 JSR L;STY#80;RTS;]
400 P.$6;G.50
410eP.    "ENTOMB"'"======"'
420 P."GUIDE YOUR '#' SYMBOL TO THE "'"BOTTOM OF THE SCREEN."'
430 P."CONTROL KEYS ARE:"'
440 P."T-UP"'"V-DOWN "'"G-RIGHT"'"F-LEFT"'
450 P."BUT BEWARE THE WALLS ARE COLLAPSING AROUND YOU AND"
460 P." TO MAKE IT "'"HARDER YOU HAVE TO CAPTURE THE o"
470 P."SYMBOLS. THE NUMBER OF SYMBOLS  IS EQUIVALENT TO THE "
480 P."DIFFICULTY." "PRESS RETURN TO START";LI.#FFE3;G.20
```

PLAY FOR TODAY

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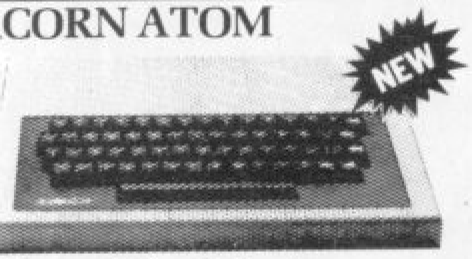


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GO

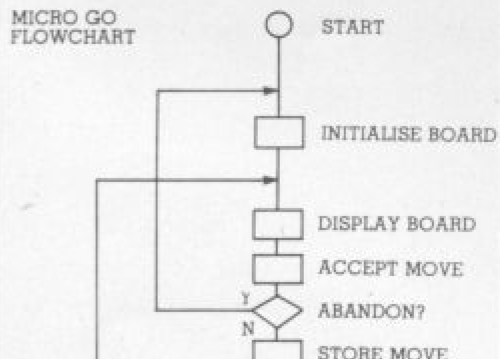
BY ALLAN SCARFF

The popular Eastern strategy game of Go is one of the few games which is quite simple to represent on a computer screen.

This is the first step in turning your computer into a Go opponent. To tackle this problem, you will need a computer: Pet, Apple, Deep Thought — any computer will do! You'll need at least 2K of RAM and a video terminal. Colour graphics would be super and so would disc storage but neither are essential.

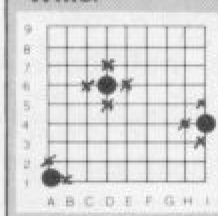
I will attempt in this and future articles to describe the building bricks of Micro Go. These are designed to minimise effort in the long run. Each rectangle shown in diagram 1 represents a function which, coded separately, can be used unchanged in future iterations of the Micro Go program.

MICRO GO FLOWCHART



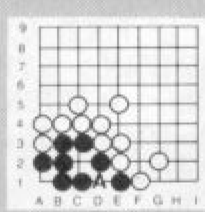
THE BASIC RULES OF GO

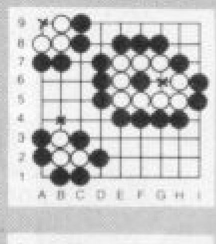
1. One player uses black stones. The other white.
2. The board starts empty. Play consists of the contestants placing, in turns, a single stone on the intersections of a 19 × 19 grid. Black starts first. Once placed, stones are not moved unless captured.
3. The object of the game is to surround territory. 1 point is awarded for each vacant intersection surrounded and also for each opponent stone captured.
4. Suicide (capturing your own stones) is forbidden!
5. A player may pass his turn.
6. A game is ended by resignation or by three consecutive passes.
7. The player with the most points wins.



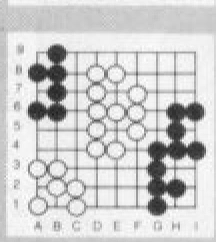
(2) LIBERTIES Unoccupied intersections adjacent to stones are called liberties. A single stone in the middle of the board has 4 liberties. At the edge it has 3 and at the corner only 2 liberties. Here the liberties are marked with crosses.

(3) THE KO RULE Ko is Japanese for "eternity", which is the time a game might take but for the KO rule. This rule forbids the immediate recapture of a single stone if the previous board position is repeated. Here for example, black has just captured a white stone at A. White is not allowed to play back at A immediately. He must play elsewhere. Then black can play at A giving life to his group. Note that unresolved KOs are filled at the end of the game (black must place a stone at A).

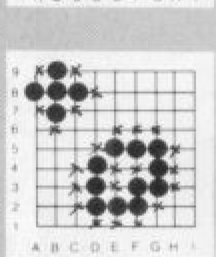




(4) CAPTURE A single stone or an entire group is in danger when it has but one liberty left. An opponent's stone placed on that liberty captures that stone or group. All captive stones are removed from the board. Assuming it's his turn, black can capture any one of the three white groups shown here.

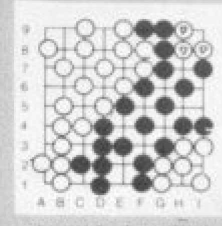


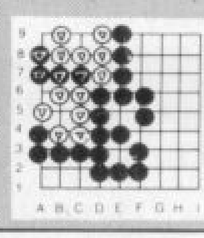
(5) EYES A space within a group is called an eye. As a consequence of the suicide rule, groups with two or more separated eyes can never be captured. Groups that can be reduced to a single liberty, internal or not, are doomed. Each group here is invulnerable. Try as you might, the suicide rule will prevent you from removing that last liberty.



(6) CONNECTED STONES Stones of the same colour, placed on adjacent intersections, are solidly connected and act as a unit. Here we show two groups of solidly connected stones along with each group's liberties.

(7) AT THE END Play ends when no further territory can be gained by either player. Stones that cannot make two eyes are deemed captured and are removed without further ado. (If there's disagreement about what should live or die, continue play until mutual agreement is gained). Diagram 7 shows the result of a game. The one-eyed white group (marked ▽) is dead. Assuming two captives apiece gained previously the final score is — white 18 + 2 and black 15 + 5. A draw!





(8) THE SEKI Occasionally you may stumble on a Seki, an example of which is shown here. Neither player has two eyes but neither can afford to play first. In this 'Mexican stand-off', neither player scores points for those groups "in Seki" (marked ▽).

Declare a 9 × 9 array (call it "Board") to simplify testing. (You can upgrade to 19 × 19 later). Each element of the Board, representing an intersection, must hold one of three values: "empty", "black" or "white" (say, 0, 1 or 2). Initialising the Board is merely putting "empty" values into every element. Storing a move is putting one of the three values into the element specified by coordinates.

The Display Board function should be coded to display the **entire** board both at the start and after each move. It may be possible to overwrite any previous display, giving the effect of altering only a single stone.

If you have graphics, try to represent the board as shown in the diagrams (then you won't shock those Go players used to the traditional board and stones).

If you haven't a graphics terminal, a fair representation can be achieved with "X"s for black stones, "O"s for white, and "+"s for vacant points.

There are many schemes for accepting moves. Here is just one example: Each move is entered by typing a command character followed by coordinates. The command characters are:

"B" add a black stone
"W" add a white stone
"–" remove a stone
"A" abandon game and reinitialise the board

For example, the stones in diagram 2 could be placed by BD6, BJ4 and BA1. The Accept move function must also translate the coordinates into numbers suitable for addressing the elements of the Board array and should reject coordinates outside of the permissible range. All that the Store move function will then be required to do is alter a specific element to empty, black or white.

You can now play Go with a friend using your computer as if it were the old fashioned board and stones (except you'll find it harder to spill the stones!). My next article will bring out some of the advantages a computer has over the traditional Go equipment.

Adventure

NAME OF THE GAME

Adventure is the name given to the dragons and castles game which features on the Atari T.V. games centre.

If you own an Atari games centre and have wondered about the Adventure cartridge, be warned that it is not the sort of game I usually describe on these pages.

This game is purely graphical and is played with a joystick control. The player has to guide his "puppet" through a maze which is shown from above and consists of several discrete "pages".

The aim is to get the treasure, avoid or kill the dragons, keep an annoying bat from disrupting your tactics too much and win home through a maze.

Three games are provided according to the package — this really means one basic game with additional features that increase the interest and difficulty level. This game, written by Warren Robinett, is popular with Atari owners, but not what you'd really call an Adventure!

Adventures would be very dull if you couldn't pick up and drop things — all those treasures — so let us take a look at possession commands, TAKE, DROP and INVENTORY.

To "take" an object, the following conditions must be met:

- The verb "take" or equivalent must be decoded from the input.
- The noun decoded must be an object in the current location.
- The player must not already be carrying too much.
- The object, player and environment may have to pass other condition tests for a successful "take".

In the example used last month, the decoded number (K1) for TAKE was 2. To check the second condition above, the array P(n) must be scanned. Refer to Figure 1. Suppose the current location (LN) is 2 and the player types "TAKE COW". The scanning may be done as follows:

```
1000 FOR I=0 TO 3: IF LEFT$(0$(I),3)=R5$ THEN K2=I ELSE NEXT: GOTO 3000.
```

Line 3000 will be a standard reply like "I don't know what a ";R3$;" is".

However, we have found the word COW and the FOR/NEXT loop is exited with K2=2. But where *is* the cow?

```
1010 IF P(K2) <> LN THEN 3010 ELSE LET P(K)=50: IN=IN+1: GOTO 3040.
```

Line 3010 is another standard reply like "I don't see ti here" since P(K2)=3 and LN=2.

If the player *is* in location 2 then the ELSE statement executes. Line 3040 is a reply, saying "OK". IN is the inventory count which is incremented to keep track of how many objects are being carried. 50 is an imaginary location number, which we will use for objects being carried. When the screen is updated, since P(2) now=50, location 3 will not show a cow.

Condition 3 has not been checked yet however, so we must expand line 1010 to cover both that and the miscellaneous condition check:

```
1010 IF P(K2) <> LN THEN 3010 ELSE IF IN > 5 THEN 3020 ELSE IF C(K2) < 0 THEN 3030 ELSE LET P(K)=50: IN=IN+1: GOTO 3040.
```

Notice that an arbitrary limit of six has been set on the total number of objects carried. C(n) is an array used as a flag for objects, and I will describe this in detail later. At this stage we can establish a convention that if C(n) is negative then for some reason the object can't be taken even though it is in the current location.

Dropping an object is simpler than taking one. After "DROP" is decoded and K2 for the object has been set:

```
1100 IF P(K2) <> 50 THEN 3050 ELSE LET P(K2)=LN: IN=IN — 1: GOTO 3040: REM if not carrying it say so else deposit at current location and decrement inventory.
```

We now have quite a collection of "standard replies:"

```
3010 (reply) = "I DON'T SEE IT HERE": GOTO (start).
3020 (reply) = "I'M CARRYING TOO MUCH": GOTO (start).
3030 (reply) = "IMPOSSIBLE!": GOTO (start).
3040 (reply) = "OK": GOTO (start).
3050 (reply) = "I'M NOT CARRYING IT!": GOTO (start).
```

The method of screening replies is dependent upon the structure of the program.

To complete our session on possession, we need a reply to INVENTORY. This is simply a matter of concatenating all the objects whose current location is 50 into one reply string:

```
1200 (reply) = "I'M CARRYING".
1210 FOR I=0 TO 3: IF P(I) = 50 THEN LET (reply) = (reply) + 0$(I):
1220 NEXT: GOTO (start).
```

FIGURE 1.

0 Cottage (0 Knife)	1 Lane	Fig. 2: Simplified network of locations showing initial positions of objects in brackets. Note: objects and locations independently numbered.
2 Forest (3 Axe)	3 Meadow (2 Cow)	
N ↑	4 Lake (1 Fish)	

ROOMS AT THE TOP

I was particularly pleased to receive a copy of Wizard's Mountain to review from the Software House. It is written in Basic so I was keen to see the speed and size of the game, not to mention the program listing. The speed for most commands is good — after hitting enter there is only a slight delay before the response.

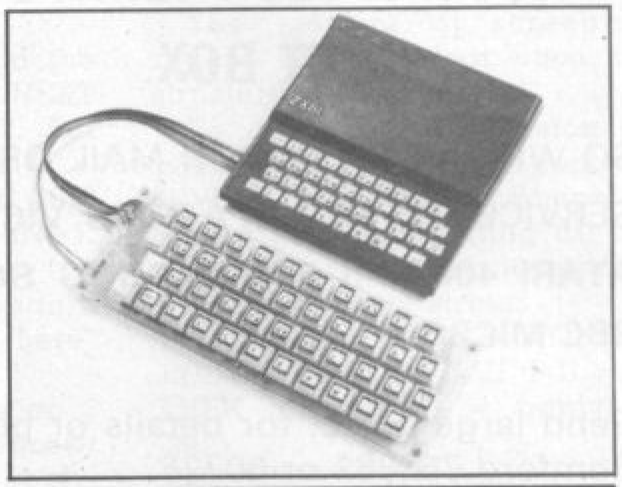
Written by Jeremy Zorwold, the setting is a mountainside castle with a number of well described rooms. Objects appear at different locations each time the game is played, making for multiple solutions. Some of these objects look very much like treasure but seemed to incur a negative score when carried. Frequently and without warning it gets dark and one's legs are often paralysed by an evil spirit preventing movement for five turns.

Among the objects are a telescope that falls to pieces for a reason I didn't discover and a digital watch, which when read caused the computer to break out of the program with an illegal function command error. This turned out to be because it was trying to compute the log of zero — for a watch? Fascinating!

BY KEITH CAMPBELL

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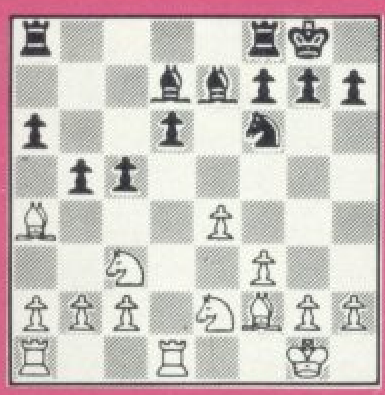


Fig 1: White to move

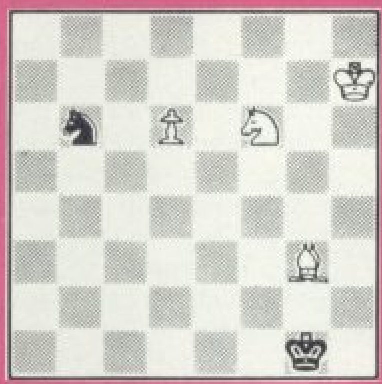


Fig. 2: White to move

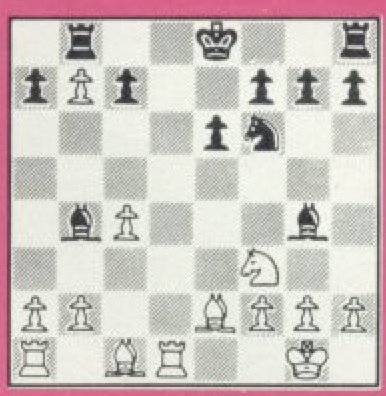


Fig. 3: White to move



Last month I demonstrated the use of the *minimax algorithm* which finds a move in any position by looking a few moves ahead and assigning values to each of the positions which can arise at the end of such an analysis. Each "half-move" looked ahead in the *game tree* is called a *ply*. Thus, if White is to move, a five-ply search would examine sequences of three moves for White and two for Black.

This month I consider the *horizon effect*, a phenomenon which arises because a program is effectively blind beyond the limits of its analysis, i.e. its *search horizon*.

The term "horizon effect" was introduced into the computer chess literature by Hans Berliner, a strong U.S. master and former world correspondence champion, in his Ph.D. thesis which appeared in 1974. However, the effect had been noticed as long ago as 1952. I can best illustrate it by quoting — with slight changes — two examples given by Berliner himself.

In figure 1, it is White to move. He is a piece ahead but cannot avoid losing his Bishop. Suppose that White is searching four ply ahead. The program will consider trying to save its Bishop by 1. B-QN3 but after 1.... P-B5; 2. P-KR3 (say), PxB; the Bishop would be lost anyway.

Eventually the program would consider 1. P-K5 and recognise that if now 1.... PxB; then 2. PxN is good for White. However, if Black were to play (his best move) 1.... PxP; White would play 2. B-N3 and there would be no way for Black to capture the Bishop in one move. Thus, within the four-ply search horizon, White would have saved his Bishop for only a Pawn!

Of course, this is absurd, since Black could still win the Bishop by 2.... P-B5. All White would have achieved would be to delay the dreaded moment by a completely worthless sacrifice of a Pawn. However, as far as White is concerned, events more than four-ply in the future do not exist, so it will happily play 1. P-K5.

Unfortunately, after 1. P-K5, PxP, White is again faced with the loss of a Bishop in four-ply. To avoid this, it might consider a further sacrifice by 2. P-B4 or even 2. RxB, but again this could simply make matters worse eventually.

This is the *negative* horizon effect, the attempt to avert some unavoidable consequence. In this particular case, a deeper search would prevent the wrong first move being made.

However, shifting the horizon cannot *eliminate* the horizon effect, just "bury" it more deeply.

The second form of the horizon effect, called *positive*, is more subtle than the negative kind and even harder to deal with. In this case, the program plays an attractive move prematurely when it could be played later to much greater effect.

In Figure 2, it is White to move and the search is being conducted to a depth of three ply.

The program notices that it can play 1. P-Q7 and promote the Pawn next move if Black does not play 1....NxP; then after 2. NxN, White has gained further material.

Unfortunately, this leaves White with only Bishop and Knight to checkmate the lone Black King, very difficult.

If instead White were to play 1. B-K5 followed by 2. B-Q4 White would win the Black Knight without giving up the Pawn, with a simple win based on promoting the Pawn. The program insists on winning material immediately, because if it does not do so within the horizon of the search the gain of material does not exist.

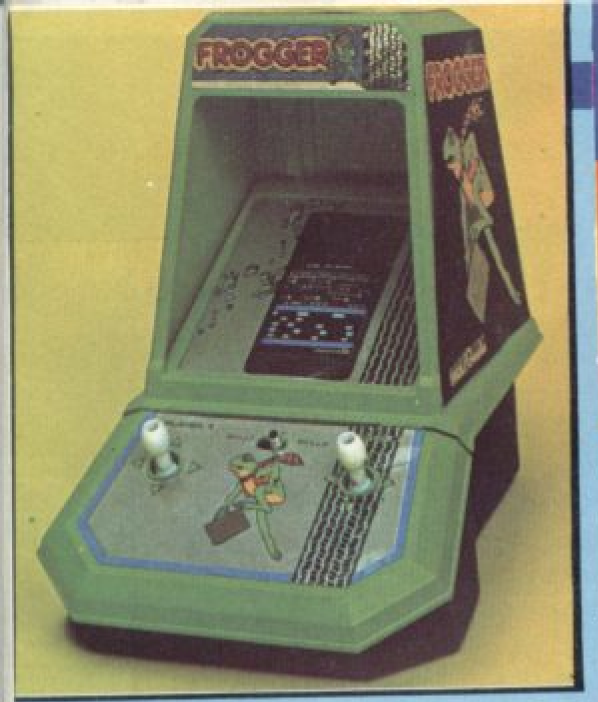
In practical play, examples constantly occur — not necessarily involving any gain of material — where it is much better to delay playing a strong move, following the old adage "the threat is greater than its execution".

Finally, here is another example of the negative horizon effect from a game between Chess 4.4 and Tree Frog from the Sixth North American Computer Chess Championship (1975)

Figure 3 shows the position after Black's 12th move. White had an indefensible Pawn on the seventh rank. However, since it gave a high value to such Pawns, White tried to save it for as long as possible by playing the sequence 13. P-KR3, B-KB4; 14. P-QR3, B-B4; 15. P-KN4.

These moves delayed the recapture of the Pawn, but only for another few moves and at the cost of ruining the Kingside Pawn structure.

By Max Bramer



american DREAMS

PLAIN VIDEO CRAZY

The 25th Consumer Electronics Show, held recently in Las Vegas showed very clearly that one thing continues to dominate the media, and electronics business, in the U.S.A.

This is not the personal computer — which seems to be causing far more interest in Europe than in America — but the video game. Perhaps this is just a reflection of the trend for Americans to stay at home for their entertainment.

After all, with petrol costing all of 90p a gallon, which they consider very expensive, where else can you go! It even costs the equivalent of £1.50 to go to a movie — again a price we British would consider reasonable, but not to our American cousins. So the video game is all the rage.

The two big names that dominate the US video game industry are Atari and Mattel. Both systems are distributed in the U.K. by Ingersoll and Dixons offshoot, ACE, respectively.

Coming up strong is subsidiary of Bally, the arcade people, with a new company called Astrovision.

As they have just signed an agreement with I.T.T. to manufacture a version of the game in Europe we can expect an interesting marketing situation to arise. More from the U.S. next month.

TABLE TOP ACTION

Coleco have come to an agreement with a number of the larger arcade game manufacturers to make table top versions of their more popular games.

They are all powered by batteries and use multicoloured fluorescent displays.

All games follow faithfully their big brothers in the arcades. Omega Race features a player controlled ship that manoeuvres through space and is in peril from star-like opponents.

PacMan has the usual monster munching its way round a maze.

Donkey Kong features a mischievous ape which kidnaps a girl and takes her to the top of a steel fortress.

Berzerk utilises a joystick control to manipulate a humanoid through a difficult maze whilst being attacked by armed robots.

Frogger (above) involves a frog in a swamp who has 60 seconds to get back to his home. Unfortunately, all sorts of things get in the way.



OUTZAP THE MONSTERS

Bally practically gave up on the video games scene last year but have now rescued the Arcade video computer from oblivion.

Astrovision unveiled seven new video game cartridges which run on the Astro Professional Arcade — formerly the Bally Professional Arcade. These are: Munchie, which is similar to PacMan, the world's most popular coin-op video game.

The Wizard, who challenges players to team up and outzap attacking monsters.

Cosmic Raiders is a fast-action Defender style game in which players raid a sector of the universe to take back stolen Energy Stars.

Solar Conqueror is an Asteroids game. Using warp space travel and other tricks, players attempt to conquer the entire galaxy.

In Space Fortress up to four players jointly defend their fortress against alien spaceships and insane kamikaze fighters.

Quest for the Orb is a totally different and engrossing adventure-style game. The object is to find the Orb.

Dangers in your quest include demons, traps, monsters. But you'll be given magical spells and will find enchanted weapons and ancient treasures.

In Pirate's Chase players try to evade a pirate while tricking him out of his treasures.

Colouring Book with Light Pen is a highly entertaining educational and fun game that lets you create multi-colored pictures on your T.V. screen, using built-in joysticks or optional "light pen."

Music Maker includes learning and fun. Just move your joystick controls to select a note.

The Arcade Video game can be upgraded to a talking computer system, in the same way as Mattel's Intellivision. The upgrade is known as the ZGRASS-32. The language in the ZGRASS-32 computer is based on an extended Basic that allows animated graphics to be achieved by a non-professional programmer in a matter of hours (see below).

A COMIC LOOK AT GAMING

Not only have Atari announced price reduction on their computers in the U.S. — the 800 has dropped 16% to around £450 but they have also increased the price of some programs.

They explain this increase as a reflection of an increase in manufacturing costs.

A new catalogue of programs from the Program Exchange (APX) has been published and contains over 80 user generated programs.

One of these, Caverns of Mars, was written by a 17-year-old schoolboy and last year's users voted it one of the four top programs.

It has now been promoted by Atari under their own trade name. The player must penetrate several layers of defences to reach the alien stronghold.

Two other new games for the 400 and 800 are PacMan and Centipede.

Atari announced a deal with D. C. Comics for the latter to produce a range of comic books based around the Atari games. The first will be based on Defender, and will be followed by one based on Berserk and Star Raiders.

Finally, Atari has shown the prototype of an up-market game system called System X.

FROM CHICKS TO CATTLE

Activision, who scored in the U.K. with the Chicken Crossing the Freeway during Christmas, have brought out four new games that will be distributed in the U.K. by Computer Games Ltd.

Barnstorm is a simulation of the crazy aero acrobatics of the twenties and thirties; Stampede (shown above) is a very good cowboy round-up game with some very deft work on the joystick needed to lasso a cow! Grand Prix speaks for itself.

A new version of a Space Flight simulation will also be with us in the near future.



COMBATANT'S VIEW OF SPACE CONFLICT





DUNGEONS AND DRAGONS

Mattel reinforced their top level position with Atari in the T.V. games centre league — by bringing out 12 new games for Intellivision.

Quick thinking and fast action are needed to play two new games in the space network. It's you against the computer in Star Strike (shown above left). Destroy five missile projectiles on the enemy planet and your mission is accomplished. If you fail, earth is destroyed.

In Space Hawks, you command a space man with five protective "shields". Gain points by destroying U.F.O.'s, comets and bubbles as they appear on the screen. The game becomes more difficult as it progresses. Play with a friend or play alone and teleport your man into hyperspace to avoid catastrophes.

In the Advanced Dungeons and Dragons cartridge, based on the popular role-playing game, avoid the dragon as you attempt to capture the treasure in a computer-controlled labyrinth. Then, carefully return the treasure to your secret room. The game is designed for one or two players.

Control the destiny of your own island in Utopia. Accumulate points by feeding, housing and educating your people; don't let hurricanes or pirates destroy their harmony.

Reversi presents a video version of Othello.

In Night Stalker you control a man in a "safe" room surrounded by a maze containing bats, spiders and a continuing parade of evil robots. Start with three weapons. As the game goes on, your weapons are replenished and the creatures become more difficult to subdue.

Defend your submarine fleet from P.T. boats, carriers and alien subs in Sub Hunt. Control your sub's speed, depth, direction and torpedo supply.

Two Tron cartridges, based on a concept from the new Disney movie of the same name, provide space-age action. In Tron I, you're Tron, and you use "deadly discs" to fight off the evil blue warrior. Tron II, designed for one or two people, lets you win points by destroying aliens while trying to penetrate the master control program's inner circle.

Pinball is a video version of the popular arcade game — with all the sounds and action of the real thing. The game contains several skill levels as well as surprise trap doors and disappearing flippers.

Designed for the young-at-heart, Frog Bog (above) lets you control a frog that can catch flies with its tongue while leaping from one lily pad to another. Don't land your frog in the water — there's a crocodile lurking!

If you are a card player, let Card Fun be your challenging partner. It provides five popular card games: Crazy Eights, Hearts, Rummy, Gin Rummy and Rummy 500. The computer deals the cards and keeps score.

Mattel have also introduced six new hand-held games.

These pocket-sized games feature multi-level play and sound effects.

Space Battle gives you a cockpit view of the universe and split-second, three-colour space action. Destroy enemy craft with twin laser beams on one of four skill levels. You have four minutes to complete your mission and return to base without crashing or running out of fuel.

Combat continues in Armour Battle with tank against tank and tank versus helicopter.

In Formula Racer you're behind the wheel for Grand Prix excitement on four different tracks.

Experience the challenge of American football in Long Bomb Football, a strategy-oriented game with four levels of skill.

Control the attack or defenders in Competition Football, a realistic two player game.

You're caught in a medieval search with Dungeons and Dragons Computer Fantasy. As the Avenger, you must find the arrow and slay the dragon. But beware of flying bats and bottomless pits, or you may become the dragon's next meal.

The Intellivision has now been expanded with a Master Unit that has Basic language and speech synthesiser.

FIND YOUR WAY OUT OF 1,000 MAZES

US arcade firm Entex Electronics has swung into 1982 with four additions to its hand held electronics toy range.

Treasure Quest is a 3D-Maze game, that uses one of the most complex L.C.D. displays ever developed for a hand-held game. The player is pitted against 1000 increasingly difficult mazes and has the option of facing greater challenges by switching to the adventure mode. Space Invaders is a version of the original game, whilst Select-A-Game is a two player system that can support a whole host of games, such as Space Invaders (right), Basketball, Baseball, Pinball and Football by changing a cartridge and the overlay on the display. A two colour L.C.D. display is used.



Finally, braking, accelerating, steering, passing and pushing your car to the limit are some of the actions on another 3D display game called Grand Prix. Perspective visual effects make it appear that the player is weaving and dodging through race traffic.

ATARI COMES TO TERMS

More Atari compatible cartridge games are being conjured up in America by a new firm in the arena Imagic.

Imagic is also aiming to capture some of the Mattel video games market with new plug-in cartridges. Out now for Atari video computer systems are Demon Attack, Star Voyager and Trick Shot, while Dungeon runs on the Mattel system.

This firm was set up in a similar way to the first outfit to bring out Atari compatible cartridges, Activision. It was formed by ex-Atari people and both companies were fighting lawsuits with Atari to stop the two firms using its expertise.

Activision recently settled its differences with Atari and is continuing cartridge production.

BY ROBIN BRADBEER



THE SHAPE OF THINGS TO COME

Moving your graphic shapes around on the screen can be a lot simpler than most computer books would have you believe.

A shape can be drawn by joining up a set of points and stored by storing the positions of all these points.

Once a shape is stored, it can be transformed in carious ways, like shifting, scaling or rotating it before it is plotted again.

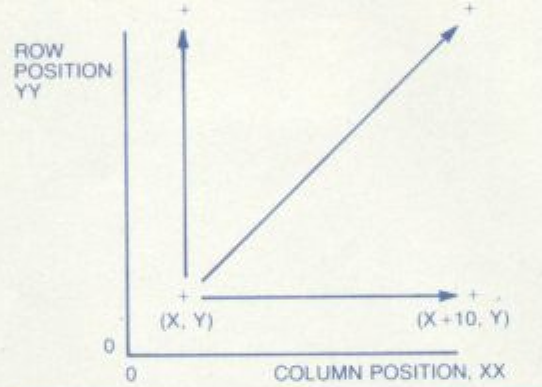
The transformation processes are interesting in themselves, but they also form the basis for many of the more advanced applications involving computer graphics, such as animated graphics and computer-aided design.

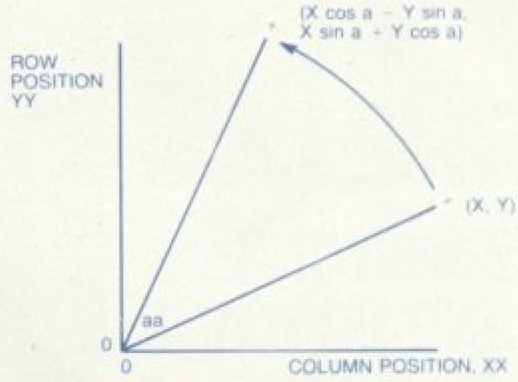
With the vertical column positions of the points in the shape stored in an array, XX, and the corresponding horizontal row positions stored in the same order in an array, YY, as shown in lines 30 and 40 of the accompanying program, the shape can be drawn by lines 60 and 70.

Transformations of a shape can be achieved quite simply. Books on computer graphics are inclined to introduce fairly sophisticated matrix methods for transformations, but they can be achieved with the use of arithmetics and some simple trigonometry.

To illustrate this, a shape can be moved to the right by increasing the column positions of all its points by the same amount. The effect on a single point is illustrated in the first figure.

Similarly, movement to the left is achieved by decreasing all the column positions by a fixed amount. Movement up and down the screen is achieved by changing the row positions of all the points in the shape, while a combination of a sideways movement with an up and down movement gives a shift in any other direction to the shape. This is also illustrated by the first figure.





A shape can be scaled by multiplying all the row positions and all the column positions by a constant scaling factor. If the scaling factor exceeds one, the shape is magnified: if it is less than one, the shape is reduced in size.

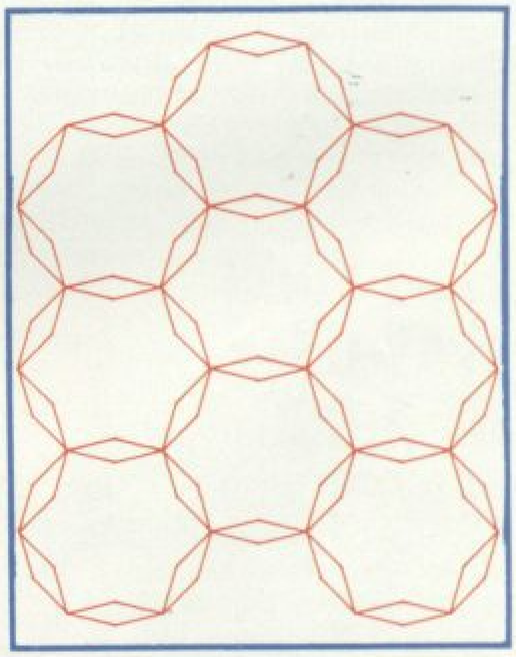
Rotation is a little more difficult to achieve than shifting or scaling. The location of a point after it has been rotated through an angle, aa, is shown in the second figure. The expression giving the location of the transformed point can be obtained by using the properties of right-angled triangles.

The following program, written for the Acorn Atom in its high-resolution graphics mode, stores and plots a square, and then interactively accepts commands to transform it before plotting it again. The inputs T, S and R, respectively, cause a translation, or shift, a scaling, and a rotation.

Line 130 achieves a shift to the right of 10 columns, a magnification by a factor of two is achieved at line 140, and rotation through 0.2 radians, approximately 11½ degrees, anticlockwise is carried out by lines 150 to 160.

The percentage signs are necessary in Atom Basic to indicate floating point variables and calculations.

The final figure shows a pattern created by shifting and rotating a simple four line shape.



```
10 DIM XX(4), YY(4), A(1)
20 %A=0.2; %C= COS %A; %S=SIN %A
30 XX(0)=10;XX(1)=10;XX(2)=20;XX(3)=20;XX(4)=10
40 YY(0)=10;YY(1)=20;YY(2)=20;YY(3)=10;YY(4)=10
50 CLEAR 4
60 MOVE XX(0), YY(0)
70 FOR I=1 TO 4; DRAW XX(I), YY(I), NEXT
80 INPUT $A
90 IF $A="T" GOTO 130
100 IF $A="S" GOTO 140
110 IF $A="R" GOTO 150
120 GOTO 80
130 FOR I=0 TO 4; XX(I)=XX(I)+10; NEXT, GOTO 60
140 FOR I=0 TO 4; XX(I)=XX(I)*2; YY(I)=YY(I)*2; NEXT, GOTO 60
150 FOR I=0 TO 4; B=%(XX(I)*%C-YY(I)*%S)
160 YY(I)=%(XX(I)*%S+YY(I)*%C); XX(I)=B; NEXT
170 GOTO 60
```

BY GARRY MARSHALL

PRACTICAL PRACTICAL PRACTICAL

PROGRAMMING By TED BALL

TRUTH IS NOT AS SIMPLE . . .

Honesty may be the best policy in life but in computing, truth can be the cause of a few problems. George Boole ran into some of these problems in the True and False statements.

Boolean algebra is fundamental to computing and is among the first topics covered in the study of computer hardware and assembly language programming.

Boolean algebra is not often covered in courses on Basic, but because the subject is so fundamental it has applications in Basic programming and most dialects of Basic include the Boolean (or logical) functions AND, OR, NOT.

A Boolean expression has one of the values True or False, and is usually met in Basic in IF ... THEN ... statements.

IF condition THEN statement creates a branch in the program, with a different path taken according to the condition being True or False. The condition is usually a simple expression as in IF A=B THEN ... or IF X$ ="YES" THEN ..., but sometimes a branch will depend on more than one condition and the logical functions provide the means for combining multiple conditions into a single compound condition.

If X and Y are conditions we can form the compound conditions NOT X, X AND Y, X OR Y, whose values are shown in the tables. Note that NOT and AND behave just as in ordinary English; NOT True is False and NOT False is True; X AND Y is True only when X and Y are simultaneously True.

"Or" in English, however, is ambiguous. It may mean one or the other, or both, as in "I don't like cabbage or spinach".

In logic, the first meaning, called "inclusive or" has been taken as OR, while the second meaning, called "exclusive or" is a separate function usually abbreviated as EXOR or XOR.

X Y	X AND Y
F F	F
F T	F
T F	F
T T	T

X Y	X OR Y
F F	F
F T	T
T F	F
T T	T

X	NOT X
F	T
T	F

COMPOUND CONDITIONS

We can use compound conditions in IF ... THEN ... statements, for example:

```
100 IF (A>0) OR (B>0) THEN 500
200 IF (A>B) AND (B>C) THEN 500
```

These can be written without the logical functions, as:

```
100 IF A>0 THEN 500
110 IF B>0 THEN 500
200 IF A<=B THEN 220
210 IF B>C THEN 500
220 ...
```

It is often possible to write a compound condition whose meaning is immediately obvious, but is not at all easy to understand when converted to a sequence of simple conditions. For example, it is clear that:

```
100 IF ((A>B) AND (B>C)) OR ((A<B) AND (B<C)) THEN 500
```

tests for A,B,C, being in ascending or descending order, but the equivalent:

```
100 IF A<=B THEN 110
105 IF B>C THEN 500
110 IF A >=B THEN 120
115 IF B<C THEN 500
```

is not at all easy to follow and would probably require some pencil and paper work before its meaning was understood.

Some Basics allow a truth value to be assigned to a variable, for example:

```
10 LET A=(B=C)
20 LET A=(B>0)
```

The actual values assigned to True and False vary but are usually 1 and 0 or −1 and 0. In many cases, although 1 or −1 is assigned For True the BASIC will accept any non-zero value as meaning True, so that

```
10 LET A = 100
20 IF A THEN PRINT "TRUE"
```

would output TRUE when run.

The logical functions may also be applied to numbers and variables, or to a mixture of numbers, variable and relational expressions. For example, LET X = (Y AND (Y>Z)) may be a valid expression. However, the result depends on the particular Basic which evaluates the expression.

In ZX81 BASIC such expressions are evaluated as follows:

X AND Y is X if Y is not 0
0 if Y is 0
X OR Y is 1 if Y is not 0
X if Y is 0
NOT X is 0 if X is not 0
1 if X is 0



This is covered in the ZX81 manual, which gives examples of how these expressions can be used in programs.

Microsoft Basic, which is used in most personal computers, evaluates logical expressions in a totally different way. It requires that the numbers involved be integers between −32768 and 32767 (so that they can be represented in binary with 16 bits), and the result is obtained by applying the appropriate function to corresponding bits. For example, 12 AND 10 is evaluated as 8, because:

12 in binary is 0000000000001100
10 in binary is 0000000000001010;
applying the AND function (as in the truth table, with 1 for T and 0 for F) we get 0 AND 0 = 0 in the first 12 places, then 1 AND 1 = 1,



1 AND 0 = 0, 0 AND 1 = 1, 0 AND 0 = 0. Collecting these together we get the answer 0000000000001000 in binary, which is 8 in decimal.

Negative numbers in binary are represented in a form known as "2s complement". To negate a binary number we change the 0s to 1s and the 1s to 0s and then add 1 (addition in binary is very simple: 0+0=0, 0+1=1, 1+0=1, 1+1=1 and carry 1). For example, to calculate −12:

12 in binary is 0000000000001100
changing 0s to 1s and 1s to 0s gives
1111111111110011
and adding 1:
1111111111110100

To see that this is sensible we can add 12 to −12:

```
 0000000000001100
+1111111111110100
 10000000000000000
```

We actually get a 1 in the 17th place, but because we are working with 16 bit numbers this 17th bit is ignored and the result is then zero, as we could expect.

The demonstration program will print out decimal and binary values which will allow you to see how X AND Y is evaluated for any pair of values. The program can easily be altered to work with OR, NOT, or any other logical function.

The program uses most of the features discussed above, and studying how it works should help you to understand the logical functions in Basic.

The 16 bit AND function is used in line 620 to test the individual bits of the number X which is to be converted to binary. P is always a power of 2 and has one bit set to 1 and all other bits 0. Since b and 0=0 and b AND 1=b, whatever the value of the bit b, X AND P will be 1 when X has a 1 in the same position as the single 1 in P, and zero otherwise.

NOW TRY THE PROGRAM

```
100 PRINT " 'AND' FUNCTION DEMONSTRATOR"
110 PRINT
120 INPUT "FIRST ARGUMENT"; A1
130 LET X = A1
140 GOSUB 500
150 IF E THEN 120
160 INPUT "SECOND ARGUMENT"; A2
170 LET X=A2
180 GOSUB 500
190 IF E THEN 160
200 LET X=A1
210 GOSUB 600
220 LET A1$=X$
230 LET X=A2
240 GOSUB 600
250 LET A2$=X$
260 LET X=A1 AND A2
270 GOSUB 600
280 LET A$=X$
290 PRINT A1;"AND";A2;"=":A1 AND A2
300 PRINT
310 PRINT A1;TAB(8);"IN BINARY IS ";A1$
320 PRINT A2;TAB(8);"IN BINARY IS ";A2$
330 PRINT A1 AND A2;TAB(8); "IN BINARY IS":A$
340 PRINT
350 PRINT
360 GOTO 120
499 REM CHECK VALIDITY OF INPUT
500 LET E = 0
510 IF (X=INT(X)) AND (X>=-32768)AND(X<=32767) THEN
    RETURN
520 PRINT " ARGUMENT MUST BE AN INTEGER BETWEEN -32768
    and 32767"
530 LET E = 1
540 RETURN
599 REM CONVERT X TO 16 BIT BINARY STRING X$
600 LET X$ = " "
610 LET P = 1
620 LET B = X AND P
630 LET B$ = "O"
640 IF B THEN LET B$ = "1"
650 LET X$ = B$ = X$
660 LET P = P + P
670 IF P = 32768 THE LET P = -P
680 IF P <> -65536 THEN GOTO 620
690 RETURN
```



Sounds

SOPHISTICATED STRINGS . . .

The new generation of computers are equipped with quite sophisticated sound facilities.

Last month I dealt with the production of simple tones. With this technique an electronic organ can be set up using the computer keyboard as playing keys.

Computers such as the Sharp MZ-80K contain a simple on-board sound generator which can output notes via a small speaker which is also built in.

Basic commands are provided in the operating system which control the sound generator directly. The system is limited to single notes and covers only three octaves but it is extremely easy to use. A tune is entered into a string variable as a series of notes to be sounded as they appear in the music, A-G.

The octave to be used is marked by a simple graphic symbol and the length of notes by the number 0-9, 0 being a 1/32nd note and 9, a whole note. Rests are entered directly into the string as R.Tempo is set by a Basic statement; TEMPO=, followed by a number.

To play the tune set up in M$, one now enters the Basic word Music=M$ and away it goes! Because the system is resident in Basic, many strings can be set up and played in any order and they can be repeated by enclosing them in a loop. Older generation computers like the Pet and Nascom can all be made to act as music generators in the same way but, because no Basic commands are in-built, the user has to set up his own system. This is now fairly easy as so much software exists which does just that. When we come to discuss the production of more than one note at a time, things obviously become much more complicated. However, this objective can be achieved in several ways.

The computer can be used to control an existing external synthesiser or a specially designed sound generating circuit. Keyboards may also be used with an interface which drives the computer and uses it as a music maker. Such methods might appeal to those with an existing synthesiser but tend to be very expensive indeed.

But what about music actually generated by the computer itself? New computers, such as the Dai and the B.B.C. computer are provided with sound generating chips on board which are capable of generating three or four notes at once.

Sophisticated operating systems are included by means of which different sound voices can be used to represent various instruments.

This is helped by a facility which changes the note envelope — the time a note takes to build up, how long it stays at maximum and how fast it decays away.

Music produced by one of these computers sounds bright and lively and has depth and harmony as required. The operating software is complicated but easy to use once it is understood.

The amount of information required by the computer to play even a simple tune is quite vast and the less you know about music, the more user friendly such a program must become. Ultimately it should be possible to enter a piece of music into the computer from a music manuscript without knowing anything about music at all!
The Atari computer is one of those supplied with a built-in sound generator capable of producing four notes at once. Such a provision might be useful to those of us who could write programs to control it.

However, Atari have supplied a software package aimed at music makers and music dunces alike. It is very user friendly and takes the "musician" through the inputting of information in easy stages. A wide variety of control is possible including: key signature, tempo, meter and volume. Music is entered phrase by phrase. Each phrase is remembered and can later be recalled to be played. Phrases can be repeated in a set order. Entering a phrase is done direct onto the screen by using the A-G notation of ordinary music. Accidental sharps and flats, changes of octave, note durations, dotted notes, bars, ties and slurs are all catered for. Once entered, notes can be added, deleted or transposed and the phrase can be played to check how it sounds.

Finally, the whole composition can be played by joining the phrases together. The tune can be monitored on the screen, all four notes will play but only one can be visualised. An experienced musician could find a few faults with the system — like the number of phrases available (10) is very limiting — but on the whole a good example of how to present a complex problem in a simple friendly way.

How can owners of computers which do not have such facilities achieve like results? Well, by using a digital-to-analogue converter such as the ZN425E, or an even simpler resistor network, it is possible to emulate all the above. Things are made much easier by commercial packages which are now available for many computers.

These range from the Alpha Syntauri system for the Apple at a few hundred pounds, to the very versatile and inexpensive Visible Music Monitor for the Pet. The latter is supplied complete with plug-in board containing a D/A converter, filters and small amplifier with provision made for feeding the output to a more powerful one.

Once such systems become available, whole libraries of music soon accumulate on tape and disc contributed to by home enthusiasts.

BY DAVID ANNAL

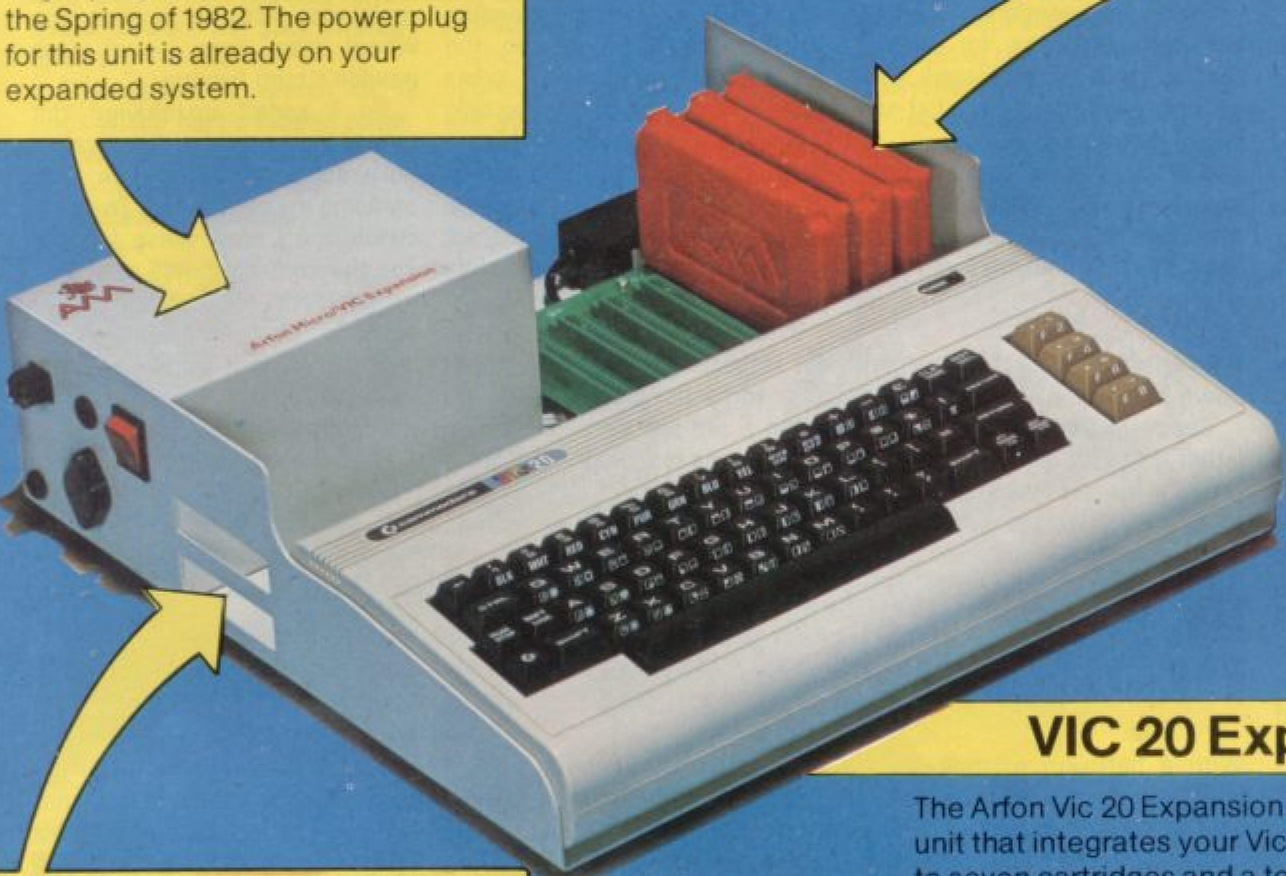
EXPAND YOUR VIC

OFFICIALLY APPROVED BY COMMODORE

From £85 plus VAT.

ARFON PRINTER

A low cost stand alone printer which will be almost essential for your larger programs will be launched in the Spring of 1982. The power plug for this unit is already on your expanded system.



EXPANDABLE TO 7 CARTRIDGES

You will now be able to use up to seven cartridges to expand from your basic Vic 20. These can include RAM memory expansion up to nearly 30K of usable memory, ROM cartridges with packaged programs, user expansion cartridges, printer software, disc software, RS232, IEEE interface, line expansion firmware and many others – besides of course all your games cartridges.

ARFON EXPANSION MEMORY
Immediately available from Arfon in cartridge are 3K RAM +2 sockets, 8K RAM, 16K RAM, 8K ROM, 16K ROM. Also a basic Vic simulator cartridge to allow tape and cartridge use without altering the system.

VIC 20 Expansion System

The Arfon Vic 20 Expansion System is a finished metal cased unit that integrates your Vic 20 with an expansion board for up to seven cartridges and a toroidal power supply (fully enclosed) to give you sufficient power for any expansion and also to power the Arfon Vic Printer. Your Vic and its screen modulator are incorporated into the expansion system to produce one unit and there is an optional lid that covers the expansion area and allows your T.V. to sit on top. Access to the various input sockets on your basic Vic 20 is not restricted while it is in the expansion unit.

Stocks are available now through your own Vic Dealer.

INTERFACES

Slots have been left to allow normal use of the cassette socket, disc socket etc., which will still run normally with your expanded system.

I would like to be included on your mailing list.

Name ______________________

Address ______________________

____

Send to:
Arfon Microelectronics Ltd.,
Cibyn Ind. Estate,
Caernarfon, Gwynedd,
N. Wales.

Arfon Micro

AM

VIDEO SCREEN



HAZARDS ON THE TRACK

GRAND PRIX

Topping the sales list for the Acetronic MPU 1000 is surprisingly, the car racing cartridge Grand Prix.

It's unusual for this type of game to be so popular with games centre owners because space theme games have stolen the show since space invaders was introduced. The fact that Ace supplies its invader pack with the console undoubtedly has something to do with it.

Grand Prix contains 10 different game versions, for one or two players. The Grand Prix game itself is first on the list and is simple in concept.

On the screen is a straight race track with a car placed at the bottom of the screen. Using the joystick controls you can drive the car to the left or right of the race course.

A few seconds after the game has started a fleet of racing cars zooms down from the top of the screen. You have to move your car to avoid the others. Be careful not to be over-eager with the joystick, it's very sensitive and if you move it too far to the left or right it will career into the barrier never mind the other cars.

Once you have worked out the technique you can try speeding up the action by moving the joystick forwards, which takes some fine control of the joystick.

The second game is Monte Carlo Rally. Again for one or two players the idea is to navigate your car around a race track which is lined with small white posts.

The track unrolls before your car revealing hazardous bends and tortuous twists. You are given a pre-set time limit to try and have as few crashes as possible.

The third game on the package is named Brands Hatch and is the most difficult to master. In fact, I found it almost impossible.

Your task is to complete a circuit of a rectangular racetrack which gets progressively more difficult. But beware, it's not a piece of cake. I never did get the hang of controlling the car. When the flag went up for the off I thought I was doing well — the car was going straight forward. Easy, I said to myself.

Then came disaster. The corner was upon me before I knew it. And crash, smack into the barrier. Turning the car left or right presented umpteen problems. Actually turning the wheel was easy — it just wouldn't stop turning.

So I ended up driving the wrong way crashing barriers on both sides of the course, and bumping my way round. The only conclusion I drew when I finally put the controls down was that its popularity is because it provides a challenge. There are practice versions for you to build up expertise before you attempt the really difficult course.

If you want to be thoroughly frustrated Grand Prix cartridges are obtainable from Wembley based Ace for £18.95.

WARRIORS FROM THE STARS

SUPER INVADER

Wiping-out alien invaders as they sweep down from the outer galaxies is a tougher job than ever in this souped-up version now on the streets.

Super Invader — running on the Interton VC4000 — provides you with a more difficult challenge than the traditional VC4000 invader game.

The basic concept remains the same. Your role as an intergalactic hero is to save your planet from the onslaught of a race of space warriors whose singular aim is to obliterate all life.

The aliens swarm down upon your firing base. They start off high in the sky but as the game progresses the invaders descend earthwards, firing missiles at your base.

On the right-hand side of the screen is a cloud which slowly but surely fills the action area — growing in regular blocks. That spells extra danger.

When the cloud form covers the aliens your missiles become useless. So the quicker you blast the invading creatures out of the sky the more chance you have of surviving.

To make the game more treacherous your firing base is stationary so you have to keep alert for alien missiles coming from all angles, shooting them down before they get to you.

Super Invader is one of the latest batch of games cartridges brought out by Hanimex for the Interton TV games centre and costs about £17 from stockists.

IN PURSUIT OF THE ENEMY

CAPTURE THE GENERAL

With a battalion of men under your command you have to trv and capture an enemy general.

On the screen you see a battlefield with two camps located in opposite corners. Dotted across the field are clumps of trees giving you and your soldiers vital cover from enemy fire.

With the joystick you control your general's antics but troop movements are under the command of Colonel Computer!

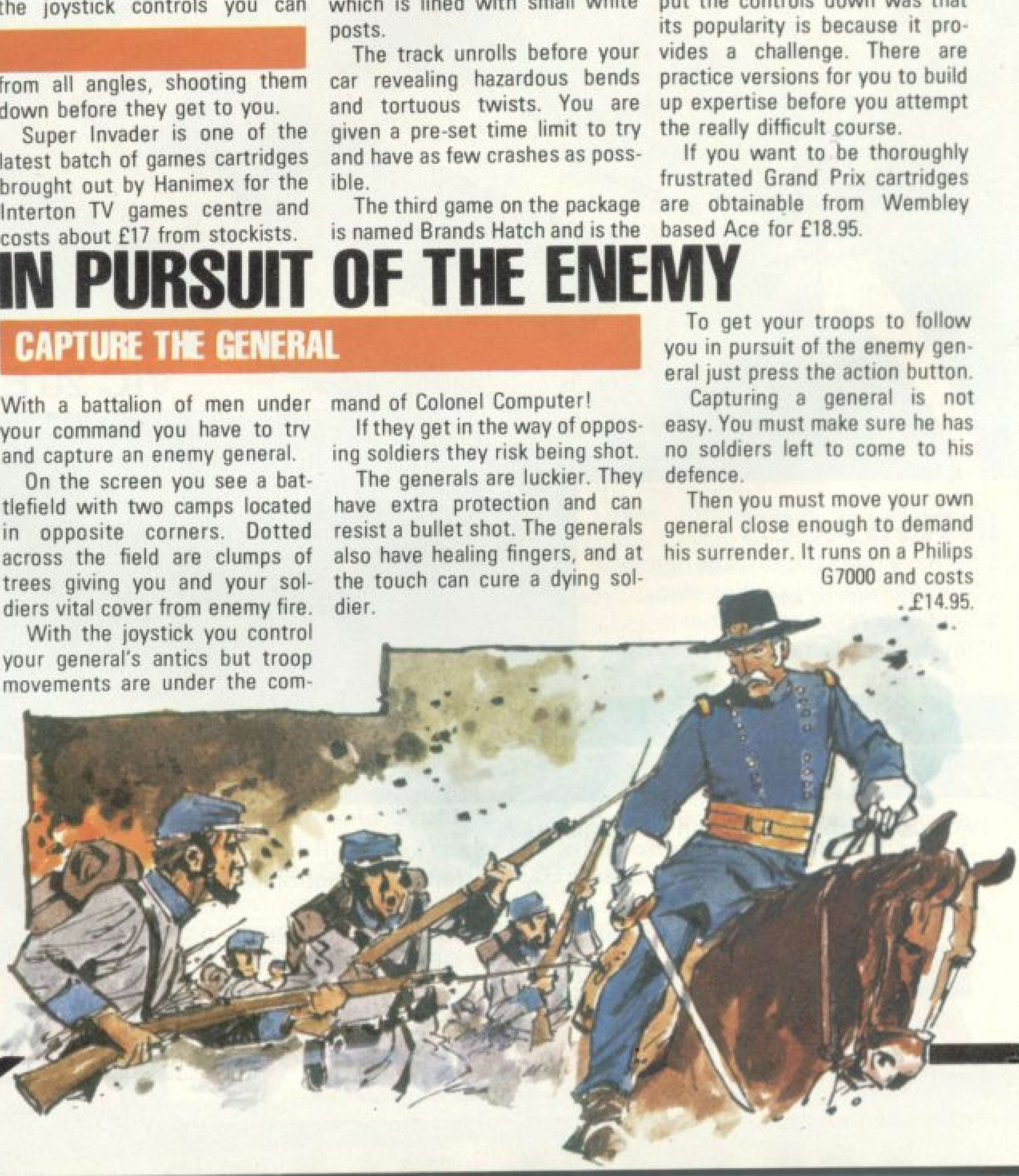
If they get in the way of opposing soldiers they risk being shot.

The generals are luckier. They have extra protection and can resist a bullet shot. The generals also have healing fingers, and at the touch can cure a dying soldier.

To get your troops to follow you in pursuit of the enemy general just press the action button.

Capturing a general is not easy. You must make sure he has no soldiers left to come to his defence.

Then you must move your own general close enough to demand his surrender. It runs on a Philips G7000 and costs £14.95.



SEARCH IN THE DARK LANDS

Begin an adventure in lands inhabited by weird creatures in a new concept in video games combining a board and the television.

Featured in Philips G7000's Quest of the Rings are a handful of characters and monsters which the player — or players — encounter and have to deal with.

In principle the game is similar to most adventure games. The player takes the role of a small band of legendary heroes. The difference is that you also have a board to work out your strategy of play.

Their job is to search for 10 rings which hold a hidden power but which are concealed in the Dark Lands guarded by a malevolent Ringmaster.

QUEST FOR THE RINGS

Eating out of the palm of his hand are several slaves who are equally vicious. In their power and ready to injure or destroy you at the slightest provocation are Orcs and Firewraths, the spider Spydroth Tyrantulus, the Doomwinged Bloodthirsts and firebreathing dragons.

The odyssey takes you through dungeons, crystal caverns with invisible walls and the shifting halls which change position every few seconds.

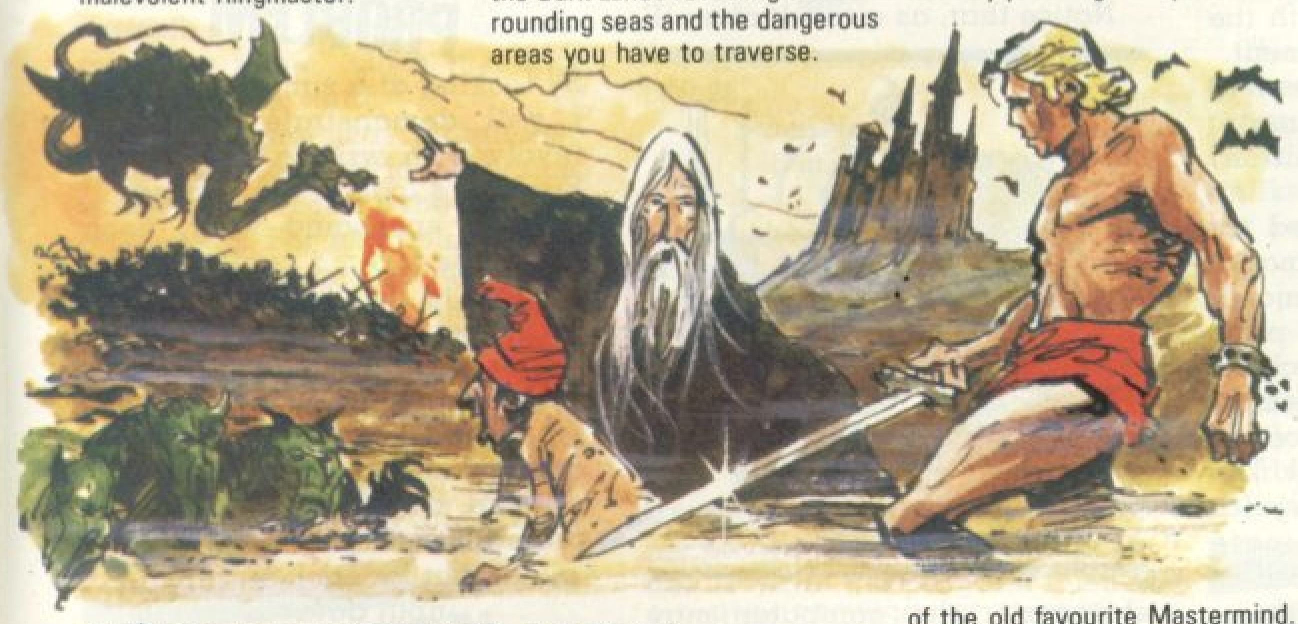
Using the board to place your figures representing whichever role you decide to play, you can work out the best plan of action. On the board itself is a map of the Dark Lands revealing the surrounding seas and the dangerous areas you have to traverse.

At the same time you can see the action as it takes place on the television screen.

More than one player can join in the Quest for the Rings, each taking a different character, ranging from a warrior — when you own a magic sword — a wizard who has the power to cast spells on monsters, a mysterious phantom who can walk through walls with ease, and finally a changeling, who has the advantage of wearing an invisible cloak.

Quest of the Rings comes with a keyboard overlay which is used for locating places marked on the map of the Dark Lands, as well as areas where dangerous beasts lurk. By pressing that part of the keyboard you will be instantly transported to the selected area.

Exactly when Quest for the Rings will be on shop shelves in the U.K. is still undecided, but Philips hope it will be readily available within a couple of months' time. The price has not been finalised but **Computer and Video Games** will keep you posted.



MASTERING THE MAZE

SUPERMIND AND LABYRINTH

You get two games for the price of one in one of the latest Philips G7000 cartridges, Labyrinth and Supermind.

In Labyrinth you must move a pawn through a concealed maze and find the exit within a set time limit. Sections of the maze are revealed as you travel through it. But take care to move your pawn in the middle of the path. If you don't the pawn's movement slows down.

There are 16 variations of this game on tap and each one consists of ten mazes for you to work through before you win.

Options include mazes which move and change as you go. This means your pawn could get boxed in thereby ending the game.

One to really fox the addict is when exits change position. Then you have to make sure you act quickly and don't get caught up in the maze. The speed of the game can be altered too.

One of the most frustrating variations is when a cat is hidden in the walls of the maze. If you are unlucky he will leap out and gobble you up.

If you don't find that taxing enough then turn your talents to Supermind, an improved version of the old favourite Mastermind. There are multiple skill levels in Supermind.

The object of the game is to break the code set by the computer — but you are limited to a certain number of guesses. The code is represented by symbols which can be any one of 47 labelled on your G7000.

To let you know how close you are to cracking the code the computer brain shows a red figure from one to four corresponding to the correct symbol of the code.

Either tackle the computer's brain or take on a friend. As an alternative you can also take turns with a friend to complete a guess set by the chip.

A copy can be obtained from G7000 stockists for £14.95.

ATLANTIC CROSSING

COCKPIT

Ever wanted to fly a Jumbo jet? Now the controls of this huge aircraft can be at your fingertips.

Your job is to pilot the jet on a flight across the Atlantic and to execute a successful take-off and landing.

You have in front of you a display of the dials and pressure guages necessary to fly the jet.

The joystick controls are used to manoeuvre the Jumbo. Take care not to fly too low, it might crash into the side of a mountain.

Cockpit runs on the Interton VC4000 video computer centre which is available from selected UK dealers. The console itself retails at just under the £100 mark, but prices vary depending on the supplier.

The Cockpit cartridge will sell for about £22.95 — more expensive than most others in the range, but the distributors Hanimex claim it is more sophisticated than previous simulation games.



DOWN TO BASIC

BY MOIRA NORRIE

THE POWER OF IF . . .

"If", so the saying goes, is one of the most powerful words in the English language. And the same is true of the Basic language.

Last month, I introduced the IF statement with the example:

10 IF RND<0.5 THEN 40

I explained the operation of this statment as follows:
if the condition RND<0.5 is true, then the computer will "jump" to line 40;
if the condition is not true, then the jump will be ignored and the computer will continue with the line following the IF statement.

In general, an IF statement will have the following format:
⟨line number⟩ IF ⟨condition⟩ THEN ⟨line number⟩

The method I have used for describing the general format of the IF statement is commonly used in programming. The parts enclosed in angular brackets, e.g. ⟨condition⟩, are descriptions of what should be placed in that part of the IF statement. The parts not enclosed in angular brackets, e.g. IF, indicate exactly what must be placed in that part of the IF statement.

The first line number is simply the line number that must appear at the beginning of every line of a Basic program. The second line number is the number of the line that the computer will "jump" to if the condition specified is true.

What sort of conditions can be tested for in an IF statement? A condition will involve the comparison of two arithmetic expressions. In my earlier example, the value of "RND" would be compared with the value 0.5. If the value of "RND" turned out to be less than 0.5, then the condition would be realised.

Using the method described above, I can give the general format of a ⟨condition⟩ as:

⟨arith. expr.⟩ ⟨relational operator⟩ ⟨arith. expr.⟩

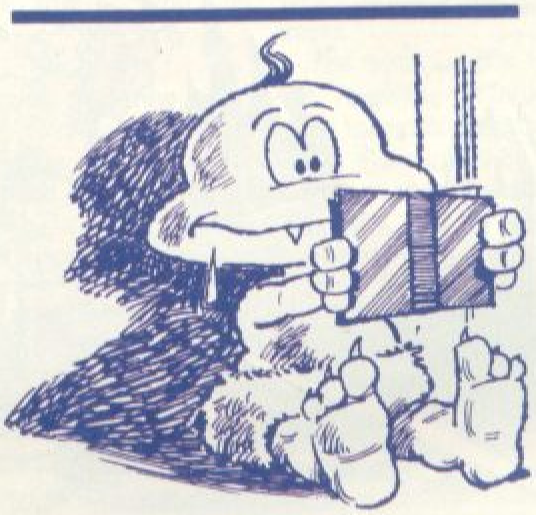
A relational operator is a mathematical sign used when comparing two values and can be one of:

< less than
< = less than or equal to
> greater than
> = greater than or equal to
= equal to
< > not equal to

To illustrate these formats, I will now give a selection of examples of IF statements. (Note that each line is a separate example and this is not intended to be considered linked in some way as part of a program!)

30 IF X=O THEN 120
90 IF A+B <=C+D THEN 10
85 IF INT(6*RND+1)<>6 THEN 20

Notice that, as a result of an IF



statement, the computer may "jump" either "forwards" or "backwards" in a program — it will simply jump to the line specified in the IF statement, wherever that might be.

Many version of Basic allow more advanced forms of the IF statement. Rather than "jumping" to another section of the program if the condition is true, it may be possible to specify a simple action to be performed, e.g. printing a message. In some versions, it is possible to specify alternative actions to be performed depending upon whether the condition is true or false — all within a single IF statement. These forms will be discussed later in the series.

JUMPING TO NEW LINES

The GOTO statement, also introduced last month, takes the general form
⟨line number⟩ GOTO ⟨line number⟩

Again, the first line number simply labels the GOTO statement. The second line number specifies the line to which the computer should jump. The GOTO statement is referred to as an "unconditional jump" as the jump will always take place. On its own, the GOTO statement is not of much use. However, used in conjunction with the IF statement, it can be used to set up alternative sections within a program.

SOLVING A PROBLEM

By looking at a simple example, I will demonstrate the steps involved in writing a program. First, let's look at the problem.

"In a sponsored walk, each entrant is given a number in the range 1 to 100. The entrants are all sponsored at a rate of 25p per km for the first 15km, and 50p per km beyond that. Write a program that could be used to print the amount earned by each entrant."

I can start with the general program outline:

```
repeat for each entrant
    input data
    print results
end repeat
```

For each entrant, I will need a pair of data values — the entrant number and the distance walked. The statement of the problem specifies that the entrant number will be in the range 1 to 100 and, clearly, the distance walked must be a positive number. However, it is not stated whether that number must be an integer, or, if it can be any real positive real number e.g. would the pair of values 25,12.5 be acceptable? I will assume that real numbers are acceptable, but, strictly speaking, I should say that the statement of the problem does not

provide all the information required!

Now that I have decided upon the format of the data for each entrant, I will require some way of determining when the end of the data is reached so that the computer will repeat the "loop" the correct number of times. If I knew that there were to be exactly 100 entrants, then I could use a FOR loop to control the number of times that the loop would be repeated. But we do not know exactly how many entrants will take part.

Although the statement of the problem says that each entrant will have a number in the range 1 to 100, there is nothing to say that there will be exactly 100 entrants. In fact, a sponsored run would involve someone in a lot of counting to determine how many turn out. It is easier to keep typing data until there is no more; then type in some preset value which will stand out from the normal data, so that the computer will stop looping. This special value is called a "terminating value" since it marks the end of the data.

In most practical situations, some value can be found which would never occur in the data for processing. For example, in the case of the sponsored walk, an entrant number of -1 would never occur — we could therefore use this as a "terminating value". As I will input pairs of values in the program, I will also provide a "dummy value" of 0 for the distance walked by "entrant number -1".

THE GENERAL OUTLINE

I can now develop the general program outline as follows:

input entrant no. , distance walked
if entrant no. = -1 *then* (end of program)
  print amount earned
  goto (input data)
end

How can I calculate the amount earned by an entrant? Assume that the entrant no. is N and the distance walked is D, then the amount earned by entrant N will be determined by:

if D < 15
  then amount earned = D*0.25
  otherwise
    amount earned = 15*0.25 + (D-15) *0.5

where the amount earned is in pounds.



AND FINALLY — THE PROGRAM

Having developed the outline of my program, I am now in a position to write the program itself.

```
10 REM SPONSORED WALK
20 REM N IS THE ENTRANT NO.
30 REM D IS THE DISTANCE
   WALKED
40 REM
50    PRINT "WHAT IS
      ENTRANT NO. AND DIS-
      TANCE WALKED"
60    INPUT N,D
70    IF N=-1 THEN 130
80      IF D<15 THEN 110
90        PRINT 15*0.25 +
          (D-15)*0.5, "POUNDS"
100       GOTO 50
110       PRINT D*0.25 ,
          "POUNDS"
120       GOTO 50
130   END
```

If your computer does not use END statements, then replace line 130 by 130 STOP

The STOP statement is similar to the END statement in that the program will stop running when it is encountered. However, unlike the END statement it does not have to be the last statement in a program — it can occur at any point in the program.

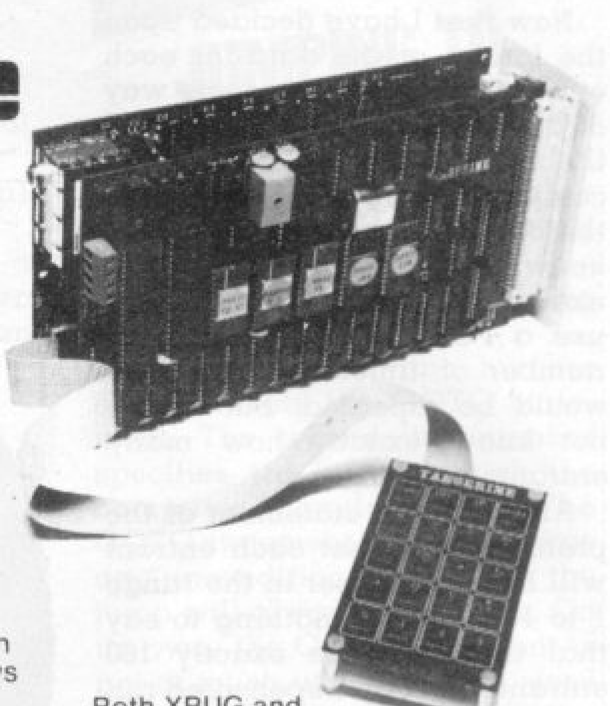
The above program could be improved in many ways. For example, the results would be a lot clearer if they were printed in a table rather than being mixed in with the input data.

NEXT ISSUE MORE INPUT

In the program for the sponsored walk, the data for each entrant consisted of a number followed by the distance walked. It would be convenient in such a situation if the name of the entrant could also be input so that it could be printed next to the amount earned for easy identification. Next month, I will describe how this can be done using "string variables".

NEXT ISSUE

Step by step with the computer system designed for tomorrow.



Microtan 65

£79·00 +VAT Ready Built

£69·00 +VAT Kit

* ★ 6502 Microprocessor
* ★ 2K Monitor TANBUG
* ★ Intelligent socket accepts keypad or full ASCII Keyboard
* ★ Chunky Graphics and Lower Case Options
* ★ Connects to unmodified B/W or Colour TV

For the first time buyer or experienced user, Microtan 65 is a superb route into personal computing. If you are looking for a sophisticated machine with the capability of expansion into a professional system, then this is the



computer for you. Step by step with the computer system designed for tomorrow. . . .

6502 Microprocessor

Probably the most popular CPU (central processing unit) for personal computers, having a powerful instruction set and architecture.

2K Monitor TANBUG

The built-in 'mind' of the machine, TANBUG controls all system functions and gives comprehensive machine-code facilities. Functions include:- set and clear breakpoints, single step through program, execute program, copy block of memory, modify memory locations and much more.

Intelligent keyboard socket

For absolute beginners we can supply an easy to use 20-way Hex keypad; for the more experienced user there is a full typewriter style ASCII keyboard. Either way, Microtan will work out exactly which type you are using and act appropriately.

Chunky Graphics Options

For drawing simple lines and graphs,, or for animated games, Chunky Graphics is a low cost answer. This set of chips plug into the Microtan board and allow graphics to be built up on the screen at a resolution of 64 rows by 64 columns.

Lower Case Option

To extend the character set to 128 characters, allows for real descenders on lower case characters and a set of extra symbols and characters for simple graphics.

Microtan Accessories

20-way Hex keypad MPS 1 Basic power supply

Aerial connector lead

Full ASCII Keyboard

MPS 2 Full system power supply

Mini — motherboard

Microtan is available ready-built or as a kit. We recommend that you should have some soldering experience before attempting the Microtan Kit, although if you do run into problems you can make use of our "Get you Going" service (telephone for details).

TANEX

* ★ 7K Static Ram
* ★ 10K Microsoft Basic
* ★ 32 Parallel I/O lines
* ★ 1 Serial I/O port
* ★ XBUG
* ★ Cassette Interface

The first step in expanding your system. Tanex provides the extra facilities necessary for the serious programmer. Memory expansion: Tanex has provisions for up to 7K of static RAM and up to 14K of EPROM using 2716 or 2732 chips.

XBUG and BASIC

XBUG is a 2K extension to TANBUG that contains a mnemonic assembler and disassembler and cassette firmware running at 300 Baud CUTS, standard or high speed. 2400 Baud Tangerine standard with 6 character filenames. Tangerine have taken out a full O.E.M. licence for Microsoft BASIC, the microcomputer industry standard, this is a full feature implementation with interrupt and machine code handling, and a superb program editor.

Both XBUG and BASIC plug directly into Tanex and are supplied with comprehensive user manuals.

Parallel I/O

When fully expanded Tanex includes two V.I.A.s (Versatile Interface Adaptors) which implement the cassette interface and the parallel I/O ports. Software in TANBUG V2.3 enables you to plug in and use a Centronics type printer. The two V.I.A.s also contain counter timers that can be used for a variety of applications enhanced by the use of the integral handshake facilities.

Serial I/O

Also on the expanded board is a serial I/O port that can be used to interface RS232 or 20Ma loop terminals or VDU's, again all controlled by TANBUG V2.3.

Tanex (Min Config) Kit £50.95 inc VAT and P & P
Tanex (Min Config) Assembled £62.45 inc VAT and P & P
Expanded Tanex Kit £104.66 inc VAT and P & P
Expanded Tanex Assembled £116.16 inc VAT and P & P

To: TANGERINE COMPUTER SYSTEMS LTD, FOREHILL WORKS, FOREHILL, ELY, CAMBS CB7 4AE

Please send me:

Microtan 65 kit/ass at £69.00 ☐

Tanex kit/ass at £50.95 ☐

Please send me further details of the complete Tangerine Computer Systems range and my local supplier ☐

I enclose cheque/postal order for the above amount OR please charge me Access/Barclaycard. My account number is

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Name: ....

Address: ....

CVG03

tangerine computer systems ltd

Forehill Works, Ely, Cambs. CB7 4AE.

Brainware

MIND ROUTINES No. 5

Using all the odd digits 1, 3, 5, 7, 9 how many 5 digit prime numbers can be made? What is the highest and the lowest prime? What is the total of all the primes that can be made?

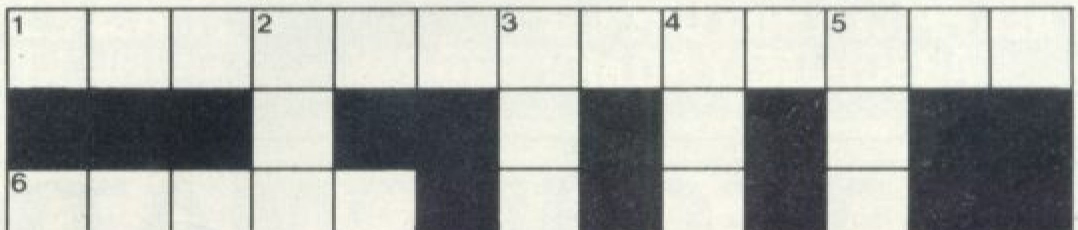
● The winner of our January Mind Routines puzzle was Graham Taylor of Lawn Avenue, Peterborough and the first correct Nevera Crossword entry out of the hat came from A. Still of Durweston Close, Bournemouth. Bottles of champagne are on their way to both winners.

The answers to our February issue's puzzles are on page 16.



Two bottles of champagne are up for grabs on this page every month. The first correct answers out of the hat for both the Mind Routines problem and the crossword on 14 March will have bottles of champagne rushed to them. Ian Pedder's Mind Routines problem will test both your ability to think through a puzzle and set it out as a program. If you are more literary minded try Nevera's Crossword and see how you get on.

NEVERA CROSSWORD



ACROSS
1. Kid David rules over computer storage device (4,4,5)
6. Move to give a higher case (5)
7. Encompass the video game (8)
9. School game (5)
11. Quite plain like the chess board (5,3,5)
15. Computer's words which contain adventurer's equipment (5)
16. In which to send off the music program (8)
17. A hundred and six balls in cricket failsafe (5)
18. Soccer player with inborn ability to torment 2 (7,6)

DOWN
2. Soccer player stranded at the start (4,4)
3. Endlessly set up a single attack (3,4)
4. Opening Fortran for equivalent with alternatives (5)
5. Get data for the Basic program from thin putty (5)
6. Twisted British Rail cables makes board game (8)
8. 2's favourite (8) video game?
10. Display clues like this, the gunfight at the O.K. Corral for example (8)
12. Happening to be the first woman in the Old Testament on the New Testament (5)
13. Change a vital terminal piece (5)
14. For — Next structures put up for what one might do with printer output (5)

● For details of *Computer and Video Games* competition rules see Page 16.

Kit Korner

CIRCUIT TRAINING

Over the next two issues I am going to move slightly away from actual kit building, to look at prototyping your own designs or those that you may find elsewhere.

It is helpful to know from the very beginning which is the best way of developing your ideas into a working circuit.

Depending on the complexity of the circuit and its function there is an ideal means of construction. There are, of course, other factors to consider, such as cost and availability and also how involved you want to get. I will try to cover all the methods but there will probably be one or two obscure types I will miss.

Many years ago I built a bridge rectifier with a dropper resistor on a group panel. It was very crude but as I had to dissipate a lot of heat it was an ideal way as I could hang the strip of high power diodes and resistors in a draught to cool it. The group panel, by the way, is simply a parallel line of solder tags formed onto a piece of insulating material.

The next stage up is probably the matrix board. This is just a piece of insulating board with an array of holes, of various dimensions, set 0.1in. apart, into which pins are inserted. By drawing your circuit out on paper you can arrange the pins at the point of each join of the components. For complicated circuits the components can be arranged on both sides of the board.

Please do not make the mistake of wrapping the component leads around the pins as it makes it extremely difficult to unsolder them later on, if you need to redesign the circuit or re-use the components. A simple lap joint will do. Also, take care not to push the pins in too far as you will fracture the board. If the board is to be well used, a drop of solder on the underside of it will prevent the pins from working loose.

If chips are included in the design you are strongly advised to use holders, which conveniently fit into the 0.1in. pitch holes. It should be possible to bend the legs of the holder outwards to be soldered to pins inserted along the side of the chip. This secures the holder onto the board.

When you come to making connections across the board, between pins, it is advisable to use insulated wire of different colours. It makes it much easier to follow the circuit if you can use particular colours for each line of the design, not only for power lines, but for data lines as well. This applies to all types of construction as a few circuits will be impossible to trace unless they are colour-coded.

Up market from the matrix board, in some respects, is the stripboard. Like the matrix, the stripboard is just a variable array of holes, set at 0.1in. pitch in an insulating board, but with a very distinct difference. On one side of the board are bonded strips of copper conductor. The components can therefore be soldered onto the board without the use of pins, although these are useful as terminal and test points.

Care must be taken to cut the tracks in the right places. Drawing the circuit out on, preferably, 0.1in. graph paper will help you sort out the layout. A special track cutter is available but a drill bit will do just as well. If necessary, components, can be laid along the tracks, so long as the track is cut between the leads. Yes, it has happened that all the components have been laid along the tracks without them being cut. For some reason the circuit did not work!

Make sure that the chip holders, if they are used, are laid across the tracks and that the tracks are cut between the pins. Again, the use of a drawing or diagram would be helpful.

Until you become proficient at designing board layout you will always use more board than you really need. This is unavoidable



to begin wi[illegible] to overcome this proble[illegible]ghtly, try to redraw the circuit a few times on paper as you intend it to appear on the board. It will give you some experience in alternative design, if nothing else, and you may discover a more rational layout.

Next month I will endeavour to deal with wire-wrapping and the use of Eurocard type circuit boards. Unlike the two types of board mentioned here, which are discrete component orientated, the Eurocards are biased towards circuits with large numbers of chips. See you then.

BY KEITH MOTT

REVIEWS

RUBIK'S CUBE UNLOCKED

COMPUTER CUBE

For those of you who have never heard of Rubik's Cube, apply to the Guinness Book of Records and move to the next review. For the rest of you, here is the computerised cube!

This program not only solves the cube as you watch, but also lets you play with the cube yourself.

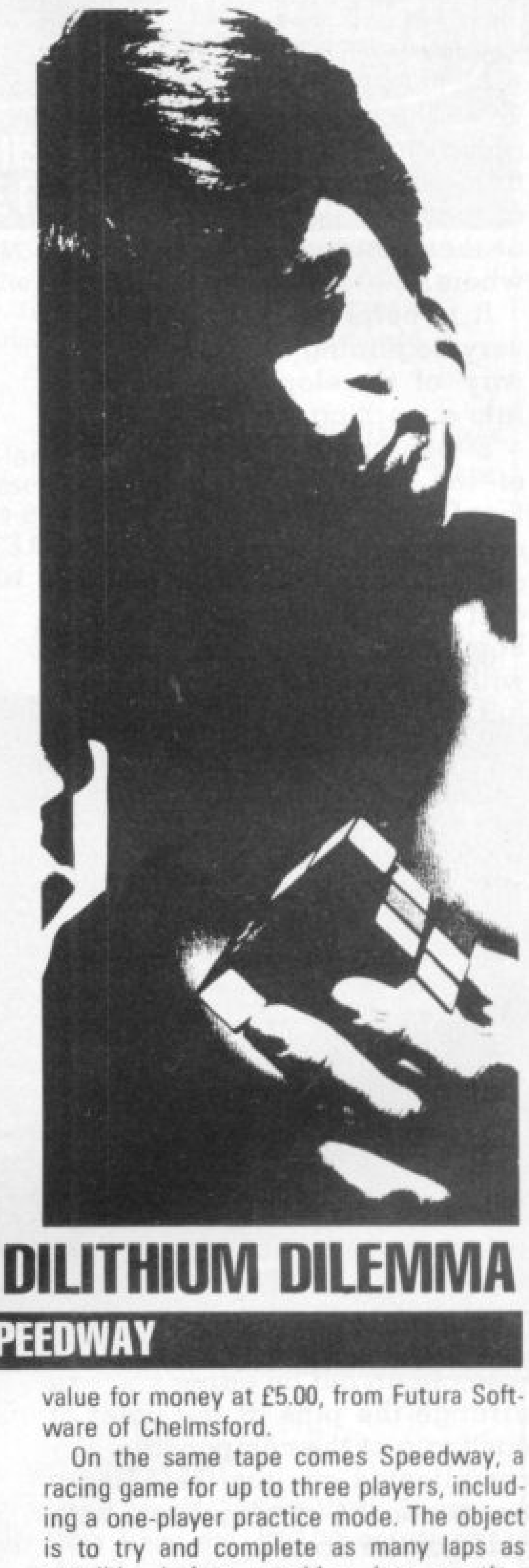
Since I have never yet solved a cube, watching the computer solve it, is both interesting and demoralising.

The standard of the display is exceptional. The screen presents you, in colour, with a 3-D view of your cube, a view of each of the six sides, a view of the side to be turned showing position before and after the turn, and all the moves made so far in normal cube notation.

The instructions are short and clear, but do require reading fully before using the program. To enter the state of the cube you have been trying to solve for weeks is simple; just key in the colour of each position on each face. The program prompts clearly and a seven-year-old had no problem with it at all.

How much you enjoy the program will depend on how much you like the cube. As an alternative to the cube there are certain disadvantages — you can't easily throw it at the wall quite like a regular cube!

As an example of how easy to use a good program should be, I place it top of the list. It runs on a 48K Apple under DOS 3.2 or 3.3, but supplies and price are not yet finalised in the U.K.



DILITHIUM DILEMMA

BEAM ME UP SCOTTY AND SPEEDWAY

The starship Enterprise lies stricken in space in the game Beam Me Up Scotty.

Your job is to collect as many new Dilithium crystals as possible from a planetary surface by beaming down an ensign, steering him to the flashing crystal and returning to the beaming-up point. His movement is controlled with the cursor control keys.

If this sounds simple, then you haven't reckoned with the randomly placed obstacles and man-eating monsters, who roam the surface. To make things worse, these monsters are sometimes invisible! Occasionally, your man panics, and it can take both skill and luck to prevent him running into a monster or obstacle.

The comprehensive instructions are very well presented within the program, and imaginative use is made of the graphics. The program runs on a 16K Nascom 2 with ROM Basic and graphics, represents good value for money at £5.00, from Futura Software of Chelmsford.

On the same tape comes Speedway, a racing game for up to three players, including a one-player practice mode. The object is to try and complete as many laps as possible before crashing into another player, the track boundary, or one of the hazards which appear at random. Varying road conditions and hazard difficulty level are selected at the start of the game.

The controls are difficult to get used to — each player has two keys to steer in four directions — and the bikes are slow to respond to changes in direction.

With three players on the track, it is a challenge to complete even one lap!

As with the former program, the graphics are good and full instructions can be printed at the start of the game. Speedway also costs £5.00, and runs in 8K on the Nascom 2 with ROM Basic and graphics.

SNAPPING UP A MINOTAUR . . . AND SAVING BABIES!

SNAPPER MINOTAUR, BABIES

This is the ninth and probably the best games pack from Acornsoft so far. All the games on this cassette use graphics and sound effects to the utmost showing just what can be achieved on the Atom through skilful programming.

The first game, Snapper, is a variation of the arcade game "Mazeman", mentioned in the November issue of Computer and Video Games. However, the game has been simplified to fit it on a standard Atom.

These simplifications include changing the "ghosts" and your man into circles (they are in fact in colour if you've got the colour encoder board fitted), and the simplification of the rules (you don't get fruit in this version).

If you haven't seen the arcade version of the game, then here's how to play. The basic object of the game is to eat as many ghosts as you can while your mouth is open (if your mouth is shut when you catch one, it eats you!).

To open your mouth you must go over one of the corner crosses. Then you have a limited amount of time before it shuts again. The graphics are good and are backed up by excellent sound effects.

The second game, Minotaur has impressive graphics too. The object of the game is to take all the gold bars from the boxes scattered around the maze, and to put them in the safe while trying to avoid meeting the minotaur who tries to catch and eat you. All this is done with 3-D pictures of the passages and the various objects in them. However, if you get completely lost, then you can call up a map of the labyrinth telling you where everything is.

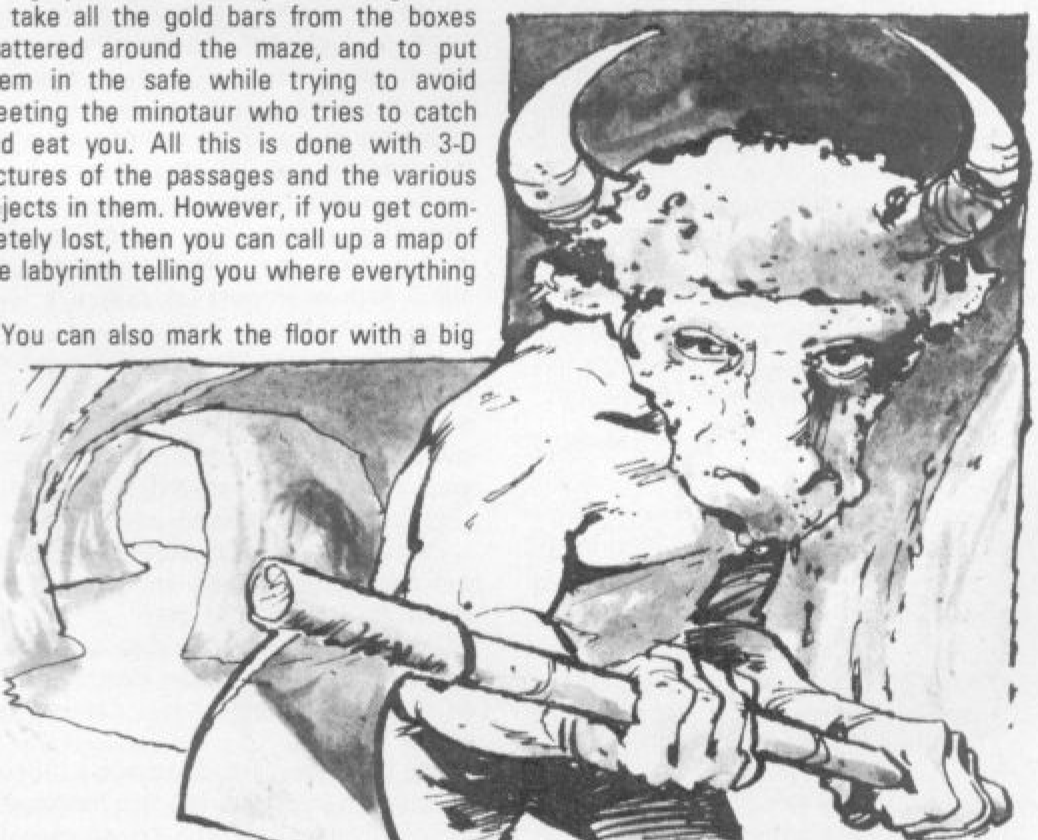
You can also mark the floor with a big cross so that you can remember where you've been. The game is very difficult to win and it ends either when you have put all five bars in the safe, or when you have been eaten by the minotaur. The scoring for this game is to put it mildly, odd, since you may often end up with a negative number of points.

This game also has sound effects telling you how far away the minotaur is — he growls when he gets close. When eaten, the minotaur just sits there in front of you smiling and winking. He doesn't actually look too convincing but that's only a small point which doesn't detract at all from the excellence of the game as a whole.

The third and last game, Babies, is an exact copy of the hand held game with the L.C.D. display in which babies jump out of a burning building. You must catch them on your stretcher and bounce them off the end of the screen before they fall to their deaths. Three are allowed to die before the game ends.

This games pack is excellent value for money and I was very tempted to play the games rather than write the review!

These games should be available from Acornsoft at the price of £11.50 for the cassette.



HARD

ROOM TO GROW

The Atom uses the 6502 microprocessor which is the same chip used in the Apple, Pet and the BBC microcomputer.

Memory capacity starts with a minimum of 1K RAM which can be expanded to 12K by adding chips. Expansion to 32K is achieved by adding an extra Eurocard inside the Atom case and then you have to buy a 19in rack which is expensive.

ROM starts at 8K and goes up to 16K on board, with extra expansion available as with the RAM chips.

The power supply needed to run an Atom is eight volts at 800 mA each for the minimum system. Acorn can supply the power unit which feeds the internal regulator. For the maximum system you need an external regulator supply.

A cassette interface port allows you to connect a cassette recorder for loading and storing information, and a printer output port for attaching a printer.

The Atom has sound capability via a loudspeaker which allows the generation of tones of any frequency.

GAMES PEOPLE

Independent software supplies have not been slow to support the Atom and a large range of games is available for the machine.

Acornsoft produces 12 games packs which contain three games on each cassette and costs £11.50 inclusive of VAT.

The company claims to be able to turn any arcade craze into an Atom game in a matter of months. One example is the game of Snapper, which recreates the popular Pacman game — this shares a cassette with Minotaur and Babies.

Also available are three Atom adventures and a chess playing program.

Among the other Atom games software suppliers are:

- Program Power (5 Wensley Road, Leeds LS7 2LX) has a range of about 30 games, from adventures to the arcade type. Astro Birds, Invader Force and 3D Asteriods are its best sellers.
- Bug Byte (98-100 The Albany, Old Hall Street, Liverpool L3 9EP) offers some 19 games, including the arcade and simulation-type. 747 is a flight-simulation program which along with Invaders and Galaxian, is its most popular cassette.
- Hopesoft (Hope Cottage, Winterbourne, Newbury, Berkshire) at present has six games concentrating more on the adventure type. Of the arcade variety it offers an elementary Pacman game called Chaser and Space Invaders. Atom Adventure is its best seller.
- A & F Software (10 Wilpshire Avenue, Longsight, Manchester M12 5TL) produces four games for the Atom of the interactive type. A radar game, Early Warning, is its most successful.
- Team 4 Software (12 Taunton House, Redcar Road, Harold Hill, Romford, Essex) offers Space Invaders and Shapemaker, an etch-a-sketcher which enables you to draw and store your own graphics.
- Computer Concepts is at 16 Wayside, Chipperfield, Hertfordshire. It produces a small range of software for the Atom including Invaders, a sound effects program, an alarm clock program and a program to increase the number of text lines and characters on the screen.

The Atom is made by Acorn Computer Ltd. and is available in kit form or ready built.

Direct from Acorn it costs £174 for the 2K assembled or £140 for the kit. A "full" Atom has 12K memory and costs £289 from Acorn.

It is designed to plug into a television set and the Atom comes complete with Basic manual, U.H.F. television lead. A power supply (cost £10.20) and a cassette lead (£1.50) are important extras.

The machine, which was launched in mid-1980, has proved popular with games players because of its high resolution graphics but also has business and educational applications.

Hardware and software is available from Acorn Computers and its associated company Acornsoft, which shares its address at 4a Market Hill, Cambridge CB2 3NJ. The prices quoted above are Acorn's, but its large dealer network will sell the equipment much cheaper.

GOOD GRAPHICS

The Atom manual contains all the information necessary to produce your own graphics and sound for games playing.

Graphics capabilities depend on the memory available. A minimum Atom has 1K of V.D.U. RAM, half of which is used for storing text. But this can be expanded up to 6K V.D.U. and 5K text space which is the maximum configuration on the board. The Atom has nine graphic modes dependent on memory:

Mode	Resolution X	Resolution Y	Memory
0	64	48	.5K
1a	64	64	1K
1	128	64	1K
2a	128	64	2K
2	128	96	1.5K
3a	128	96	3K
3	128	192	3K
4a	128	192	6K
4	256	192	6K

X is the horizontal axis and Y the vertical.

The "a" modes refer to colour which requires the floating-point ROM and the colour coverter board — about £20 each.

The highest mode is more than adequate for reproducing arcade-type games and the more sedate displays required by strategy games. For example: Acornsoft has designed a version of Kensington which fits on the Atom screen.

Sound is available from a single bit on an output port and the user must write a machine code program to generate noises — very easy as the Atom has built-in assembler — the manual contains a machine code program to impersonate a harpsicord.

Volume and quality from the internal speaker leaves a lot to be desired, however the sound output is available on one of the pins on the din socket which the cassette uses. A seven pin din plug will connect it to an amplifier.

BASIC PROBLEM

One of the main criticisms levelled at the Atom by other computer users, is that its Basic is very different from the Microsoft Basic.

Among the peculiarities are the operations to carry out print formatting, floating point arithmetic and string handling.

You can also use abbreviations for the most widely used command words. The string handling commands are also unusual — again to conserve memory space and speed up the string manipulation operation.

The Atom has an in-built assembler which enables you to produce machine code programs. Machine code can also be placed into memory and assembler statements be made part of a Basic program so that it returns control to Basic after the machine code has run.

Owners of the fully expanded Atom can take advantage of the Atom Forth implementation. The Forth language is a programming language which can be implemented on microcomputers and offers high-level ways of solving a wide range of problems.

It is a compiled language and programs run very quickly when you use it. The cassette contains a Forth dictionary and compiler, a tape interface/screen editor, a graphics package and a high resolution graphics demonstration.

Pascal can be used with the Atom but you need extra memory to link it in with either the System 2 or 3.

The Acorn Pascal package includes a compiler, an editor and an interpreter and an in-line assembler for programming critical routines.

The List Processing Language (LISP) can be used on the Atom but this language is usually used when working on research programs rather than production programs.

ALL YOU WANTED TO KNOW ABOUT THE

CORE

OPTIONAL EXTRAS

A variety of peripherals are available for the Acorn, both from Acorn and other specialist firms.

The Atom was designed as a cassette based system, not as a disc-based one, but in the near future Acorn is to bring out a single disc drive unit which should cost around the £200 mark.

Acorn claims any cassette recorder can be plugged into the Atom and used to save and load programmes but the more expensive the recorder the better the performance.

Acorn markets a printer which will produce hard copy from the Atom. It is called the GP-80A and sells for £232. The GP-80A is a dot matrix printer and provides characters printed in single and double widths, also graphics.

The 2K system needs the Atom printer drive chips which fit inside the machine's casing. These retail for £11. Having expanded the Atom you need a wire link from pin 17 of the 8255 chip to pin 17 of the printer connector.

There are no joysticks on sale for the Atom but Atari joysticks can be converted. A booklet on the subject can be obtained from Burgaids, 32 Guithavon Road, Witham, Essex. The £2.50 12 page booklet also contains some Atom games programs.

Additional memory boards can be bought from Acorn or Basildon-based Timedata which specialises in the Atom.

You can get 1K RAM sets from Acorn for £11.22 each (shop around as these come a lot cheaper) and a 4K floating point ROM for £23.00. If you buy the 12K Atom it comes with the system. An 8K memory card is also available. It is connected inside the Atom and costs about £50.

Timedata supplies a 16K add-on RAM for £59.50 and a 32K RAM board for £74.00.

A 64K dynamic RAM card can be connected inside she Atom. It is made by Audio Computers of Southend and is available from the manufacturers or Technomatic of 17 Burnley Road, London NW10.

Extra memory is not usually required for playing games on the Atom but is usually needed if the user wants to build up a large database of information. According to Acornsoft all of the games software runs perfectly on a 12K Atom.

The user port on the Atom is similar to the Pet's (8 bit), so any peripheral advertised for the Pet user port can be connected to the Atom. You will need to make an adapter lead up and change the software — most manufacturers will make these alternatives available.

One interesting aspect is a voice synthesiser available from Wide Band Products of Royston, Herts. Its Speakeasy unit with power supply unit and speaker for £69 (plus VAT) will connect to the Atom.

The Atomtel facility allows users to access massive mainframe databases via the information service Prestel. The Atomtel ROM plugs into the Floating Point ROM socket (£30), you also need a modem and Isolating Unit (£70) and a PSU + cables (£20).

A few of the Atomtel facilities are Auto Dial, Auto log-on, full Prestel character set and provision for downloading software.

A USER'S VIEW

I bought the minimum kit Atom for about £130 from one of the dealers.

Being a dab hand with a soldering iron it took me a long evening to construct but it's not hard for beginners because the construction manual which comes with the kit version only is quite comprehensive.

The keyboard is a problem so take care, but the grapevine says that a new keyboard will soon be used.

I had toyed with a Pet previously so I was slightly perturbed by the reports of Atoms' peculiar Basic but within a week there was no problem.

The Atoms' "idiosyncratic" approach to PEEK-ing, POKE-ing, print formating and string handling is not only more compact than other methods, but more logical.

The floating point arithmetic is a bit complex because one has to prefix with "F". But you soon discover the speed advantages of Integer and only use Floating Point when you need to.

The extra 2114s and VIA 6522 come next and I had a fully expanded Atom and my wallet didn't notice. The beauty of the Atom is that you slowly build up and eventually you've got a hard disc-based system, with colour, Prestel, Atomtel, BBC Rom set, Wordpack, Printer, Econet and speech.

And finally, one tip for those who intend to get serious use out of the Atom. Buy, build, borrow or steal a 5 volt 3 amp regulated power supply the Atom P.S.U. will support a maximum board, but if you are going to expand sooner or later you'll need it.

If things go wrong, Acorn has a service department but the company is notoriously difficult to reach by phone.

BOOKING TIME

Several authors have been tempted into print to give others the benefit of their Atom experiences.

Acornsoft is in the throes of producing a book titled **Atomic Secrets**. This publication will consist of programming hints and techniques which Acornsoft's programming team has employed in producing software for the machine. It will give advice of how to get over many problems.



The **Acorn Atom Magic Book** is another publication on sale from Timedata. It is full of simple programs, mainly games, for the Atom and also programming tips for the amateur.

The **Magic Book** also covers converting programs from other machine's Basic into Atom Basic, together with useful subroutine addresses contained in the ROM. The **Magic Book** costs £5.50.

A book along the same lines, called **Getting Acquainted With Your Atom**. It is an introduction to Basic using examples of games and educational programs, as well as a section on graphics. This book is slightly more expensive costing £7.95 and is published by Database Consultancy of Gidea Park, Essex.

For the more advanced programmer who seriously wants to learn about the subject in more depth, a book titled **6502 Assembly Language Programming** by Lance Leventhal is a good buy. It's a thick book packed with information detailing standard features of assembler language and also going into the complexities, but in a readable style. The publisher is Osborne-McGraw-Hill and the price is £5.50.

Starting Forth is useful for those who have bought Acornsoft's recently introduced Forth implementation package. Forth has generated a lot of enthusiasm amongst micro users because it is a high level language which is easily implemented on low memory systems. It was invented about 10 years ago but is just now becoming more widely accepted mainly due to the Forth Interest Group. **Starting Forth** is published by Forth Inc. which is owned by the language's author, Charles Moore.

Acorn supplies its own documentation with every computer it sells. For the Atom this includes the **Atom Manual** (£8.00), the **Basic Manual** — which can be used with Acorn's Systems 1, 2 and 3 and costs £7.50 — and a sheet of information on any integrated circuit for £1.00.

The manual which is written by David Johnson Davies of Acornsoft, also contains a section for the advanced user.

E ACORN ATOM . . . BUT WERE AFRAID TO ASK

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

ADVENTURE A type of game in which the player takes over a character role and retrieves a number of treasures or objects by a trial and error process giving instructions to the computer. The "hero" (or player) encounters a variety of hazards often taking the form of dangerous monsters, wizards and animals. Some adventure games are so complex that they take weeks, or months, to solve.

ALGORITHM A process or set of rules to carry out a task or solve a mathematical problem.

ARRAY A series of items (data or information) arranged to form a meaningful pattern.

ARROW KEYS The keys on a computer keyboard marked with arrows. Used for moving the cursor across, or up and down the V.D.U. screen.

ASSEMBLY LANGUAGE A language built up with memory codes designed to make programming easier.

BOOLEAN An algebra developed by George Boole consisting of logical operations as opposed to arithmetic operations. A Boolean variable is a two-valued variable like true or false, on or off.

BRIDGE RECTIFIER One of the components of a power supply whose function is to help smooth out AC voltage.

BUG A slang term given to a mistake in a computer program which prevents it from working. It can also refer to a mechanical, electrical or electronic defect in a computer.

BYTE A term to measure a number of Bits (BInary digiTS), usually eight bits to a byte.

CHIP A tiny piece of silicon which holds all the components that make up a microprocessor.

CO-ORDINATES These are used in drawing graphs. To plot a point on a graph you select the X (horizontal) co-ordinate and the Y (vertical) co-ordinate. You plot the point where the two meet on the graph.

COMMAND In writing programs this word refers to an instruction word which specifies an operation which the computer must perform.

COMPUTER LANGUAGE Languages are used to make the computer perform operations. They consist of instructions or commands. There are different types of language for carrying out different tasks.

DATA LINE A transmission line carrying computer information.

DEDICATED CHIP A chip (microprocessor) which has been specially programmed to perform a single or special group of applications, e.g. computer games. ROMs are usually the means by which dedicated chips are developed.

DIGITAL ANALOGUE CONVERTER A device used to convert analogue voltages and currents to the digital representation used by computer systems. This is so computers can process data sensed directly from the external world.

DISC A magnetic storage device. It can be either a hard or floppy disc. Hard discs can usually store more information than floppy discs and are used with mainframe computers.

DISC DRIVE A unit which is connected to the computer, used for loading the information stored on discs into the computer.

DISC STORAGE The method of storing information on discs as opposed to cassettes.

DROPPER RESISTOR This is a large resistor which is used in power supplies to bring the voltage rate down if required.

EUROCARD A type of printed circuit board suited to circuits with a large number of chips.

FLOATING POINT This is a notation used for the calculation of numbers in which the arithmetic point, binary or decimal, is movable but not necessarily the same for each number.

FUNCTION A special purpose or characteristic action.

GOSUB A Basic command instructing the computer to go to a subroutine in a computer program.

GRAPHICS The name given to pictorial representation of data.

HARDWARE The general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

HIGH RESOLUTION GRAPHICS A method of using Basic commands to move a drawing head to any position on the screen and drawing a line

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

between two specified points. This facility is available on several makes of microcomputer.

INTEGER A number which does not contain a decimal point, i.e. a whole number.

INTERACTIVE A word used to describe a system which is capable of real-time man-machine communications.

K Abbreviation for kilobyte.

KILOBYTE A measurement of memory capacity. 1024 bytes of memory. So 8K is equivalent to 8192 bytes.

LANGUAGE See "Computer Language".

L.C.D. (Liquid Crystal Display) A display containing liquid crystals which light up when electricity touches them. Used in calculators and watches.

L.E.D. (Light Emitting Diode) Provides a simple display and consists of an electron tube which lights up when electricity is passed through it. Used as an alternative to liquid crystal.

LINE NUMBER Refers to the number assigned to a line or row of characters contained in a computer program.

LOAD Putting information from auxiliary storage into internal storage of a computer. It can be either a complete program or any data. When you load a program you put the contents of the program into the computer's memory from storage either on a disc or a cassette.

LOOP A Basic function referring to the repeated execution of a series of instructions for a fixed number of times.

MACHINE CODE The term used to refer to symbols or numbers assigned to parts of a machine.

MAINFRAME COMPUTER The jargon word used to describe a very large computer.

MEMORY A device which information — data — can be copied into, stored, and later obtained from.

MICROCOMPUTER A tiny computer (as the name suggests) consisting of hardware and software. The main processing blocks are made of semiconductor integrated circuits.

MINIMAX ALGORITHM An algorithm which defines the smallest and greatest possibilities in solving a task or mathematical problem.

NUMBER CRUNCHING The operation in computing which carries out the arithmetic and logical processes which information has to go through.

OPERATING SYSTEM Firstly, this can be used to describe an organised collection of techniques and procedures for operating a computer. Secondly it refers to a part of a software package — the program or routine — defined to simplify procedures including input/output and data conversion routines.

PEEK A statement used in Basic which allows you to read the contents of a specified memory address.

PERIPHERALS Equipment which is used with a computer, e.g. printers, V.D.U.s and disc drives.

POKE An instruction used in most versions of Basic allowing you to store integers in a specific place in memory.

RAM (Random Access Memory) This is a memory chip which you can load programs and data to and from.

RANDOM NUMBER A number selected at random from an ordered set of numbers.

REAL TIME This is on-the-spot computing when the operation is performed during the time an event is taking place in time to influence the result.

RND (RANDOMISE) This a Basic command referring to the procedure for making numbers, data, or events random.

ROM (Read Only Memory) A memory chip which can only be read from and not written into.

ROUTINE A set of coded computer instructions used for a particular function in a program.

SOFTWARE Another name for computer programs. It can also refer to computer documentation.

STRING A connected sequence of characters, words or other elements usually symbolised with the (dollar) sign.

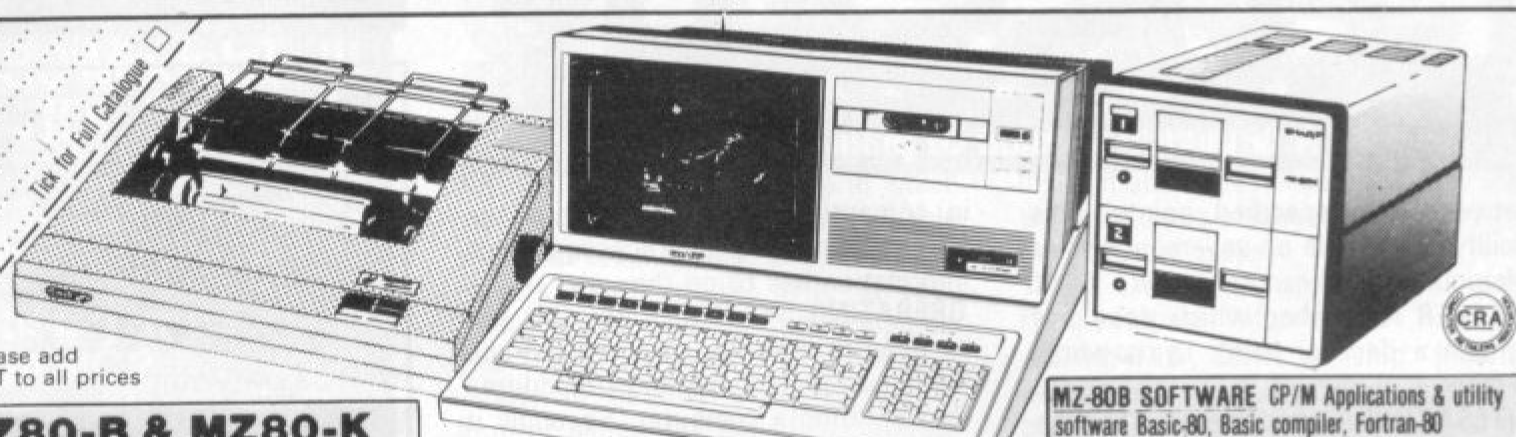
SUBROUTINE A computer program routine that is translated separately.

SYNTAX The name used to refer to sentence structure rules of programming language.

USER FRIENDLY Software or hardware which is easy for computer users to operate and understand.

USER PORT The entry channel to which a data set (set of similar data) is attached.

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